Philip B. Mason.

198 **Berkeley** (M. J.) and **Broome** (C. E.) Continuation of Notices of British Fungi, from the "Annals" (No. 1182 to 1630); 13 *plates* —Cooke (M. C.) British Fungi—20 Extracts from Grevillea—Discomycetes, from the Edinburgh Herbarium—Smith (W. G.) How Mushrooms are Reproduced; 1 *pl. and cuts*—Reproduction in Coprinus Radiatus; 8 *pl.*—Resting Spores of the Potato Fungus—Perceval (C. H. S.) List of Fungi in the neighbourhood of Warwick (1872)—Together in 1 vol, *half calf*,

Smith, W. G. Two Species of Pezizæ, new Discomycetes Fungi, British Grasses. Two Species of Grasses.

Berkeley, M. J. On three new Species of Agaricus from a Stove, List of 4th Fasc. of Fungi Exsiccati.

Cooke, M. C. Two British Moulds, Revision of Geoglossum, Phragmidium, On some Indian Fungi, On Pezizæ bruneæ, On Pezizæ calycinæ. On the tendencies of modern Botany.

Plowright, C. B. Two Species of Fungi from Norfolk.

Phillips, W. & Plowright, C. B. New and Rare British Fungi. 3 parts.

Phillips, W. On a new British Species of Agaricus.

Rehm Dr. On Pezizæ calycinæ.

Taylor J. Fungi collected by Mr Templeton in the N. of Ireland.

MUSEUM OF COMPARATIVE ZOOLOGY HARVARD UNIVERSITY

# Grevillea,

A QUARTERLY RECORD OF

## CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

EDITED BY M. C. COOKE, M.A.,

*Author of "Handbook of British Fungi," "Fungi, their uses," &c., "Rust, Smut, Mildew, and Mould," &c., &c.*

VOL. III.

1874—5.

WILLIAMS AND NORGATE,
HENRIETTA STREET, COVENT GARDEN, LONDON;
SOUTH FREDERICK STREET, EDINBURGH.
LEIPZIG: A. DURR. NEW YORK: WESTERMANN & CO.

G. P. BACON, PRINTER, LEWES.

*Flor. no.* 2635.—Sporidia narrowly fusiform, straight or curved, often quadriguttulate, ·0008 in. (·02 m.m.) long.

On stems and leaves of living *Potentilla argentea*. Albany. June. (*Peck. no.* 280.) New York. (*W. W. Denslow, no.* 88.)

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## BRITISH FUNGI.

*By* M. C. Cooke.

Since the publication of the "Handbook of British Fungi" a considerable number of additions have been made. Some of these have already been enumerated or described by Messrs. Berkeley and Broome in the "Annals of Natural History;" others we purpose, from time to time, to describe and illustrate, as far as possible, in this Journal. The following belong to the Order *Coniomycetes*:—

**Nemaspora grisea.** *Corda.* "Grey Nemaspora."

Perithecia simple, fleshy, white; nucleus white; spores oblong, semi-pellucid, white; tendrils greyish-white, sub-diaphanous, short. —*Corda Ic.* iii. *f.* 68. *B. & Br. Ann. N.H. no.* 1B10. *Libert exs. no.* 389.

On dead twigs. Hatton. May 23, 1867.

**Protomyces.** *Unger.*—Entophytal. Spores simple, aggregated, always immersed; epispore firm, diaphanous; endochrome granulose, coloured; immersed in the matrix.—*Unger Exantheme t.* 5, *f.* 27. *De Bary, Beitrage. Corda Anleitung, p.* 8.

**Protomyces Menyanthis.** *De Bary.* "Bogbean Protomyces."

Spores aggregated in roundish or confluent patches, immersed in the substance of the leaves, purplish on the surface; spores subglobose, brownish.—*De Bary Brandpilze p.* 19. *Fckl. Sym. Myc. p.* 75. *Fckl. exs. no.* 260. *Cooke exs. no.* 295. *Berk. in Rabh. F.E. no.* 1500.

In leaves of *Menyanthes trifoliata.*

**Protomyces Ari.** n. s. "Arum Protomyces."

Spores aggregated in elongated patches in the substance of the leaves and petioles, always covered, globose, simple, brown, endochrome granular, epispore smooth.

In leaves and petioles of *Arum maculatum*, Chichester. May, 1872. (*Dr. Paxton.*)

**Æcidium Statices.** *Desm.* "Sea lavender cluster cups."

Hypophyllous. Spots subrotund or confluent and irregular, purple; peridia in subrotund circinating clusters, sometimes irregularly disposed on the nerves and petioles, urceolate; margin lacerated, white; spores orange.—*Desm. exs. no.* 132. *Cooke exs. no.* 444.

On leaves and petioles of *Statices.* June—July. Fleetwood, 1859 (*Rev. A. Bloxam*). Walney Island, 1871 (*C. Bailey*). Near Basingstoke, 1871 (*R. S. Hill*). Near Chichester, 1872 (*F. V. Paxton*).

**Æcidium Parnassiæ.** *Grav.* "Parnassia Cluster Cups."

Hypophyllous. Spots pallid; peridia in subrotund patches, irregularly disposed, tawny yellow, between urceolate and concave, the margin thick and nearly entire; spores pallid.—*Duby. Bot. Gall.* ii. *p.* 904.

On leaves of *Parnassia palustris.* Near Glasgow (*Dr. Greville*). The original specimen is in the Edinburgh Herbarium.

*Hyphomycetes.*

**Volutella roseolum.** *Cooke.* "Rosy Volutella."

Stem distinct, whole plant rose-pink; stroma subglobose, crowned above with obtuse cylindrical spores, surrounded by long flexuous, septate, attenuated, hyaline setæ.

On *Bilbergia.* Glasnevin. *(W. S. Keit.)*

Evidently allied to *Chætostroma stipitatum*, Corda.

**Volutella stipitatum.** *B. & Br.* "Stipitate Volutella."

Stem short, brownish, or none; stroma spherical, fleshy, covered above with a stratum of rosy spores, and furnished with solitary, rigid, septate, subulate, hyaline setæ; spores ovate-oblong, minute, hyaline.—*Chætostroma stipitatum, Corda Ic.* iii. *f.* 83. *B. & Br. Ann. N.H. no.* 1312. *Psilonia stipitata, Lib. exs.* 287.

On elder. Batheaston, March, 1869.

"This belongs properly to the genus *Volutella*."—B. & Br.

**Epicoccum micropus.** *Corda.* "Small-stemmed Epicoccum."

Gregarious; tufts effused, black; stroma subglobose, then depressed, reddish-brown; casidia emergent, clavate, transversely septate, brown; spores subglobose or trahedral, base depressed, apodal or very shortly pedicellate, smooth, brown.—*Corda Ic.* iii. *f.* 82. *B. & Br. Ann. N.H. no.* 1313.

On decaying *Lactarius deliciosus.* Ascot. Oct.

**Spondylocladium.** *Preuss.*

Hyphasma creeping, septate; fertile flocci erect, simple or somewhat branched, septate; spores homogeneous, cellular, laterally opposite or verticillate.—*Preuss in Sturm. D.F.* vi. *p.* 105.

**Spondylocladium fumosum.** *Preuss.* "Smoky Spondylocladium."

Tufts effused, black; hyphasma branched, septate; flocci simple, septate, erect, pellucid, brown, bearing three or four spores in a verticillate manner from the upper septa, spores subfusiform, brown, with the endochrome twice divided.—*Preuss in Sturm. D.F. no.* 35, *t.* 53. *B. & Br. Ann. N.H. no.* 1314, *t.* 18, *f.* 7.

On rotten sticks. Batheaston. March. Spores ·001 in. long, ·0004-·0005 in. wide.

**Graphium stilboideum.** *Corda.* "Cabbage stalk Graphium."

Gregarious; stem erect, subulate, simple, black, opaque; head of spores glutinous, whitish, then livid; threads simple, whitish; spores ovate, oblong, pellucid.—*Corda Ic.* ii., *f.* 69. *B. & Br. Ann. N.H. no.* 1315.

On cabbage stalks. Batheaston. April, 1869. Spores ·0002-·0004 in. long.

**Peronospora entospora.** *B. & Br.* "Clavate Peronospora."

Fertile threads simple, clavate, surmounted by a crown of apiculi, bearing the ellipsoidal conidea, each of which papillate at the apex;

*B. & Br. Ann. N.H. no.* 1317, *t.* 18, *f.* 8. *Basidiophora entospora Roze & Cornu, Ann. Sc. Nat. Ser.* v., *vol.* xi , *t.* 4.

On *Erigeron canadense.* Wimbledon. June. Resting spores echinulate ·001 in. diam. *(M.J.B.)*

**Peronospora Lamii.** *Braun.* "Dead nettle Peronospora."

Fertile threads short, 5-7 times dichotomous, branches attenuated, patent, all more or less arcuate, ultimate ramuli often elongated and acutely subulate. Conidia pedicellate, globose or ovoid, quite obtuse, membrane pale violaceous. Oospores slightly brown.—*Rabh. Myc.* ii., *no.* 325. *De Bary Ann. Sc. Nat.*, 1863, xx., *p.* 120.

On *Lamium purpureum*, &c. Welshpool (*Rev. J. E. Vize*).

**Peronospora Ficariæ.** *Tul.* "Buttercup Peronospora."

Fertile threads small, usually 5-6 times equally or unequally dichotomous, ultimate and penultimate branches arcuate, reflexed or inflexed ultimate often subulate. Conidia broadly ellipsoid and obtuse, membrane pale violaceous. Epispore of Oospores pale yellowish brown.—*Tul. Compt. Rend. Jan.* 26, 1854. *De Bary, Ann. Sc. Nat.*, 1863. xx., *p.* 117. *Fckl. exs. no.* 3. *P. grisea Rabh. Herb. My. no.* 322.

On *Ranunculus repens.* Welshpool (*Rev. J. E. Vize*).

**Oidium aurantium.** *Cooke.* "Orange Oidium."

Forming dense, irregular, effused, bright orange tufts, sometimes several inches in length. Hyphasma creeping, branched, robust, septate, surmounted by simple or branched moniliform threads, which break up into subglobose or elliptical spores; endochrome granular.—*Cooke exs. no.* 448.

On spent hops. Burton-on-Trent. Aug. 1871. (*Edwin Brown, Esq.*)

**Endodesmia.** *B. & Br.*

Forming little tufts; flocci shining, glaucous, smooth, without septa, slightly curved; spores concatenate, uniseptate, eliptical, appendiculate at each extremity.—*B. & Br. Ann. N.H. no.* 1318 (1871).

**Endodesmia glauca.** *B. & Br.* "Glaucous Endodesmia."

Spores ·0004-·0005 in. long, ·0002 in. wide.—*B. &. Br. Ann. N.H. no.* 1318, *t.* xx. *f.* 9.

On cabbage stalks. Batheaston. April.

**Acremonium ranigenum.** *B. & Br.* "Frog Acremonium."

Stem composed of the aggregated flocci; tips elongated, free; spores agglomerated, globose, echinulate, shortly pedicellate.—*B. & Br. Ann. N.H. no.* 1319, *t.* xviii. *f.* 10.

On dead frogs. Monkton Farleigh. Sept.

Stem composed of a multitude of septate threads, of a delicate lemon-yellow, which diverge upwards and form a subglobose head; the threads give origin on all sides to globose spores crowded so as to form little masses. Spores ·0004 in. diameter.

# BRITISH FUNGI.

*By* M. C. Cooke.

## *Gasteromycetes.*

**Lycoperdon Hoylei.** *B. & Br.* "Hoyle's Lycoperdon."
Peridium stipitate, subglobose, bristling with elongated rigid brown warts, sterile base small, confluent with the capillitium, spores globose, echinulate, lilac.—*B. & Br., Ann. N. H., No.* 1307.
On the ground.—Reading (Mr. Hoyle). Oct.
Stem 1 in. high, $\frac{3}{4}$ in. thick, lacunose, olivaceous within; peridium 2 in. across; warts $1\frac{1}{2}$-2 lines high; capillitium and spores lilac; spores ·00015 in; mycelium threadlike, white.

**Scleroderma geaster.** *Fr.* "Stellate Scleroderma."
Sessile, sub-globose, growing pallid, peridium dehiscing at the apex in stellate laciniæ; inner mass dirty purplish black; spores globose, verrucose. *Fr. S. M., iii., p.* 46. *B. & Br. Ann. N. H., No.* 1308. *Seem. Journ. Bot.* ix. *t.* 116, *Trans. Woolh. Club*, 1870, *p.* 252, *plate. Lycoper. rotundum, &c. Mich. t.* 99, *f.* 1.
On the ground. Near Hereford (Dr. Bull). Oct.

**Geaster tunicatus.** *Vitt.* "Tunicated Geaster."
Outer peridium splitting to the middle in rather large laciniæ, internal stratum thick, evanescent. Capitulum sessile; peridium flaccid, mouth minute, conico-fimbriate, circumscribed by a paler, scarcely determinate zone; columella with a long pedicel.—*Vitt. Mon. p.* 18, *t.* 3, *f.* 3. *B. & Br. Ann., N. H., No.* 1306. *Geaster lageniformis, Cooke, Hdbk. No.* 1079.
Amongst Rhododendrons.
Messrs. Berkeley and Broome seem to regard this as the correct determination of the species described in Cooke's Handbook, No. 1079, under the name of *Geaster lageniformis*. Not having seen specimens we accept their decision.

**Badhamia capsulifer.** *B.* "Capsular Badhamia."
Peridium sessile or very shortly pedicellate, spherical, or ovoid, bluish-black, or blue-grey, dehiscing irregularly, seated on a whitish membrane; spores globose, pale brown, endochrome granular. *Berk. Trans. Linn. Soc.* xxi., *p.* 154. *Sphærocarpus capsulifer. Bull: t.* 470, *f.* 2. *Trichia capsulifera. D.C. Fl. Fr. ii.*, 254. *Physarum capsuliferum Chev. Par.* i., *p.* 339.
On living leaves of *Tussilago petasites*. Cheshire (T. Brittain.)

**Perichæna quercina.** *Fr.* "Oak Perichæna."
Peridia globose, yellow; somewhat lacerated, flocci and spores yellow.—*Fr. S. M., iii.*, 192.
On oak trunks. Autumn. Rare.
Detected by Mr. T. Brittain near Manchester, and determined by C. E. Broome, Esq., on whose authority it is inserted, as we have never seen specimens.

Running over grass and various substances, after the fashion of *Tremella sebacea*; white, soft, springing from a thin cotton-like mycelium; pores $\frac{1}{80}$ inch wide, short, angular, with thin dissepiments.

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## BRITISH FUNGI.

*By* M. C. Cooke.—(*Continued from page* 40.)

### *Hymenomycetes.*

**Agaricus (Lepiota) Georginæ.** *Smith.* "Crimson-tinged Lepiota."

Pileus white, slightly fleshy, fragile, at first campanulate, then expanded, covered with a minute, dense, viscid pruinosity, which, as well as the white flesh, instantly changes to crimson when touched; margin at length striate; stem slightly attenuated upwards, also covered externally with minute, viscid pruinosity, changing to crimson when touched; ring evanescent; gills free, very thin, moderately distant, somewhat ventricose, white, the edge becoming crimson when touched; spores white.—*Smith in Seem. Journ. Bot.* ix. (1871), *p.* 1, *t.* 112.

On mosses in a cool fernery. Chelsea.

Pileus $\frac{1}{2}$ to 1 in. across. Stem 1-2 in. long. Spores ·0003× ·0002 in.

**Agaricus (Lepiota) metulæsporus.** *B. & Br.* "Clavate-spored Lepiota."

Pileus campanulate, rather fleshy, white, grooved, adorned with small pallid scales; margin appendiculate; stem nearly equal or slightly clavate; pallid, lemon-coloured, stuffed; gills white, ventricose, approximate; spores nine-pin shaped, or obliquely clavate; mycelium thread-like.—*B. & Br. Ceylon Fungi, no.* 67. *Ann. N.H. no.* 1182.

Pileus 1 in. across; stem $2\frac{1}{2}$ in. high, 1 line thick; gills nearly 2 lines broad. This species, which at present has been found only once in this country by Mr. Broome, and which in external characters approaches *A. clypeolarius*, is at once distinguished by the length of the spores, which is ·0006 in.—*B. & Br.*

**Agaricus (Lepiota) Terreii.** *B. & Br.* "Terry's Lepiota."

Pileus sub-hemispherical, bright tawny, rough with minute warts; stem sub-equal, clad with furfuraceous scales of the same colour; ring at length torn; gills white, narrow, remote.—*B. & Br. Ann. N.H. no.* 1183.

On sandy ground. Forres.

Pileus 1-2 in.; gills not branched; spores ·0002×·00015 in. This species, which appears quite distinct, approaches *A. granulosus* on one side, and *A. acutesquamosus* on the other, but it is nearer to the latter than the former. The spores of *A. granulosus* are slightly larger, those of *A. acutesquamosus* are rather longer, and at the same time narrower.—*B. & Br.*

**Agaricus (Lepiota) ermineus.** *Fr.* "Ermine Lepiota."
Pileus fleshy, even, smooth, at length silky about the margin; stem fistulose, equal, smooth; ring erect, becoming lacerated; gills approximate.—*Fr. S. M.* ii. *p.* 22. *Sv. Bot. t.* 596. *f.* 1. *Krombh. t.* 25. *f.* 34, 35. *Fr. Ep. p.* 15 *B. & Br. Ann. N. H. no.* 1184.
In grassy places. Coed Coch.
Fragile, wholly white, inodorous, with the taste of radishes. Krombholz says that the spores are fusiform.

**Agaricus (Lepiota) ramentaceus.** *Bull.—Bull. t.* 595. *f.* 3. *Agaricus* (*Armillaria*) *ramentaceus. Cooke, Hdbk. no.* 35.
Under trees. Coed Coch.
In the "Handbook," No. 35, this is referred to *Armillaria.*

**Agaricus (Lepiota) sistratus.** *Fr.* "Fibrous-ringed Lepiota."
Pileus fleshy, rather thin, campanulate, pruinose; stem sub-fistulose, equal, ring and stem below it, fibrillose; gills nearly free, ascending, white.—*Fr. S.M.* 1. *p.* 24. *Fr. Ep. p.* 18. *B. & Br. Ann. N.H. no.* 1185. *bis.*
On sandy ground. Forres.
This pretty species is remarkable for the filamentous ring.

**Agaricus (Lepiota) delicatus.** *Fr.* "Delicate Lepiota."
Pileus somewhat fleshy, convexo-plane, smooth, even, viscid; stem fistulose, squamulose; ring densely floccose; gills free, crowded, thin.—*Fr. S.M.* i. *p.* 23. *Fr. Ep. p.* 20. *B. & Br. Ann. N.H. no.* 1186.
About an old stump. Sept. Powerscourt.
Pileus hemispherical, obtuse, rivulose, viscid, smooth, pallid, 1 in. across; stem $\frac{1}{2}$ in. high $\frac{1}{4}$ in. thick, transversely punctate, squamulose, stuffed with flocci, white above; veil floccose, slightly appendiculate; gills free, rounded behind, approximate, pallid. The veil is really double, floccose, covered with scaly particles. Taste like *Polyporus squamosus.—B. & Br.*

**Agaricus (Armillaria) robustus.** *A. & S.* "Robust Armillaria."
Pileus fleshy, compact, convexo-plane, unequal, smooth; stem solid, short, attenuated downwards, rooting, fibrillose above the ring, white below; gills emarginate, reaching the stem.—*A. & S.*, *p.* 147. *Fr. S.M.* i. *p.* 26. *Fr. Ep. p.* 21. *Krombh. t.* 25. *f.* 15-20. *Br. Bath Trans.* 1870, *p.* 59.
In woods, &c. Leigh Down, Bristol.
Short, robust, pleasant; pileus bay, tawny, or reddish, variable in size.

**Agaricus (Armillaria) denigritus.** *Fr.* "Smutty Armillaria."
Pileus hemispherical, obtuse, fleshy, tawny; flesh whitish; stem subequal, solid; striate above the ring, white; gills adnexed, tawny.—*Fr. in Mus. Suec. B. & Br. Ann. N.H. no.* 1187.
On a grass plot near shrubs. Coed Coch.
At first sight very like *A. Leveillei,* but the white spores at once distinguish it.—*B. & Br.*

## BRITISH FUNGI.

*By* M. C. Cooke. *(Continued from p.* 56.*)*

**Agaricus (Tricholoma) pravus.** *Lasch.* "Deformed Tricholoma."

Reddish brown, pileus somewhat fleshy, campanulate, then expanded, umbonate (slightly silky), stem stuffed, then hollow, floccose, attenuated downwards; gills adnexed with a tooth, eroded, powdered with white.—*Lasch. Lin.* iv., *No.* 532. *B. & Br. N. H. No.* 1191. *Fr. Ep. p.* 42.

In a stove. July. Kew.

Considered by Fries as a variety of *A. ionides.*

**Agaricus (Tricholoma) cælatus.** *Fr.* "Embossed Tricholoma."

Pileus somewhat fleshy, convex, umbilicate, flocculose, then rugose or cracked, becoming pale; stem stuffed with flocci, equal, smooth, tawny; gills sinuate, adnate, crowded, dingy white.—*Fr. Ep.*, *p.* 42. *B. & Br., Ann. N. H., No.* 1192. *Br. Bath, Trans.* 1870, *p.* 61.

On the ground. April. Charmy Down.

Spores subglobose, ·0003 × ·00015 in. Stem 1 in. high, at length fistulose, incrassated above, scarcely or slightly pruinose. Pileus scarcely 1 in. broad, brownish, then greyish-brown.

**Agaricus (Tricholoma) sordidus.** *Fr.* "Dingy Tricholoma."

Tough, pileus somewhat fleshy, campanulato-convex, then plane or depressed, subumbonate, smooth, hygrophanous, margin at length slightly striate; stem stuffed, fibrilloso-striate, rather curved, thickened at the base; gills rounded, rather crowded, violaceous or dingy-white, at length sinuato-decurrent.—*Fr. S. M., i., p.* 51. *B. & Br., Ann. N. H., No.* 1196. *Fl. Dan. t.* 1843, *f.* 2. *Buxb.* iv., *t.* 12, *f.* 1.

On the ground, amongst dung. Sept.

Spores pale ferruginous, ·0003 in.

**Agaricus (Tricholoma) lixivius.** *Fr.* "Ashy Tricholoma."

Fragile, pileus rather fleshy, convex then plane, smooth, moist, umbo evanescent; margin flattened, membranaceous, slightly striate; stem stuffed, then hollow and compressed, equal, floccoso-pruinose; gills truncate, free, soft, rather distant, greyish.—*Fr. Ep., p.* 54. *B. & Br., Ann. N. H., No.* 1197.

In pine woods. Nov. Ascot.

**Agaricus (Tricholoma) putidus.** *Fr.* "Stinking Tricholoma."

Pileus somewhat fleshy, hemispherical, umbonate, even, soft, hygrophanous; stem hollow, fragile, sub-compressed, pruinose; gills adnexed, ventricose, crowded, cinereous.—*Fr. Ep. p.* 54. *B. & Br., Ann. N. H., No.* 1198.

In fir woods. Nov.

Stem 1½ in. high, 3 lines thick, wholly fibrous, soft and fragile; pileus olive-grey, hoary when dry, here and there glistening. Gills 2-3 lines broad, distinct. Odour mealy, rancid.

**Agaricus (Tricholoma) resplendens.** *Fr.* "Shining Tricholoma."

White, pileus fleshy, convexo-plane, smooth, glutinous, with a

silvery lustre ; stem solid, stout, smooth, or flocculose at the apex ; gills free, then uncinate adnexed, somewhat distant, unspotted.—*Fries Summ. Veg. Scan. p.* 274.

In shady places. Reading.

Stem sometimes equal, sometimes bulbous, $\frac{1}{2}$ in. thick. Pileus 3 in. broad.

**Agaricus (Clitocybe) nigrescens.** *Lasch.* "Blackish Clitocybe."

Whitish ; pileus thin, soft, at first convex, obtuse, then plane, sub-umbonate, and somewhat depressed ; stem solid, tomentose ; gills thin, decurrent, very much crowded, narrow.—*Lasch. Linn., Vol.* IV., *No.* 521. *B. & Br., Ann. N. H., No.* 1199.

In larch plantations. W. G. S.

Pileus 2-3 in. broad ; stem $1\frac{1}{4}$-$1\frac{1}{2}$ in. long, 2-3 lin. thick. Odour rather sweet, taste unpleasant.

**Agaricus (Clitocybe) tornatus.** *Fr.* "Regular Clitocybe."

White. Pileus fleshy, thin, orbicular, plane, sub-depressed, smooth, shining ; stem stuffed, equal, smooth, somewhat striated ; gills decurrent, adnate, rather crowded, plane.—*Fr. S. M. i. p.* 91. *Fr. Ep. p.* 62. *B. & Br., N. H., No.* 1200.

Amongst grass at the foot of old decayed elm stumps. Oct. Leicestershire.

Small, very regular, inodorous, stem slender, firm, pubescent at the base. Disk of pileus darker.

**Agaricus (Clitocybe) orbatus.** *Fr.* "Grey-gilled Clitocybe."

Pileus submembranaceous, umbilicate, then infundibuliform, smooth, hygrophanous ; margin at length striate ; stem hollow, equal, tough, smooth, cinereous brown ; gills decurrent, distant, at first dark-grey, then frosted with white.—*Fr. Ep. p.* 74. *Bull. t.* 248, *f. c. B. & Br., Ann. N. H., No.* 1200.* *Buxb.* IV., *t.* 3, *f.* 1.

In pine woods. Nov. Ely.

Pileus blackish-brown.

**Agaricus (Clitocybe) membranaceus.** *Fr.* "Membranaceous Clitocybe."

Pileus infundibuliform, brick red, even, membranaceous ; stem fistulose, naked, attenuated upwards ; gills decurrent, pallid.—*Fr., El. p.* 13. *Fl. Dan., t.* 1012. *Fr. Ep. p.* 68. *B. & Br., Ann. N. H., No.* 1201.

In pine woods. Street, Somerset.

Fries, in his Epicrisis, regards this as a form of *Ag. infundibuliformis.*

**Agaricus (Clitocybe) parilis.** *Fr.* "Flocculose Clitocybe."

Pileus somewhat fleshy, convexo-plane, atomate, flocculose ; disc depressed ; margin deflexed, involute ; stem stuffed, fibrous, tough, rather firm, naked, dingy ; gills deeply decurrent, crowded, narrow, grey becoming whitish.—*Fr. S. M. i. p.* 168. *Pers. M.E. t.* 26, *f.* 7. *Fr. Ep. p.* 69. *B. & Br. Ann. N.H., No.* 1202.

By the side of plantations. Coed. Coch.

Slightly hygrophanous, but not becoming white.

**Agaricus (Collybia) distortus.** *Fr.* "Distorted Collybia."
Pileus fleshy, convex, then expanded, obtusely umbonate, smooth, even, growing pallid; stem somewhat hollow, ventricose, tomentose, attenuated, somewhat twisted, sulcate, pallid; gills slightly adnexed, subserrate, narrow, very much crowded; white, then spotted with reddish-brown.—*Fr. Ep. p.* 84. *B. & Br., Ann. N. H., No.* 1205.
At the roots of trees. Oct. Bowood.

**Agaricus (Collybia) coracinus.** *Fr.* "Rancid Collybia."
Strong smelling. Pileus rather fleshy, convex, then expanded, rather irregular, even, naked, hygrophanous; stem hollow, rigid, not rooting, subcompressed, squamulose with a white meal above; gills adnexed, seceding, scarcely crowded, rather broad, whitish-grey.—*Fr. Ep. p.* 95. *B. & Br., Ann. N. H. No.* 1207.
In fir plantations. Nov. Batheaston.
Pileus fuscous then grey, not silky, 1½ in. and more broad; stem tough, 1½ in. high, 4 lines thick.

**Agaricus (Collybia) murinus.** *Batsch.* "Brown Collybia."
Pileus rather fleshy, companulato-convex, then expanded, umbilicate, smooth, then somewhat squamulose or rugulose, growing pale; stem hollow, cylindrical, not rooting; gills slightly adnexed, broad, rather distant, dirty white, becoming pallid.—*Batsch. f.* 19. *B. & Br. Ann. N. H. No.* 1210. *Fr. Obs.* 2. *p.* 115. *Fr. El. p.* 97.
On the ground in woods. Marlborough Forest. Oct.
Pileus brownish, becoming pale.

**Agaricus (Collybia) clusilis.** *Fr.* "Closing Collybia."
Pileus submembranaceous, hemispherical, expanded, umbilicate, smooth, hygrophanous; margin rounded, inflexed, slightly striate; stem stuffed with flocci, then hollow, smooth, flexile, not rooting; gills subarcuate, affixed, broad, semicircular, plane, white, growing pallid.—*Fr. Ep.*, 98. *B. & Br., Ann. N. H.*, 1211. *Bull, t.* 411, *f.* 2.
Var. β. **Minor.** Amongst Hypnum. Coed Coch. Oct., 1869.
Stem 1½-2 in. high, 1 line thick; pileus ½-1 in. broad.

**Agaricus (Mycena) cohærens.** *A. & S.* "Velvety Mycena."
Pileus rather fleshy, campanulate, then expanded, obsoletely umbonate, velvety, cinnamon-brown, growing pale; stem horny, very rigid, even, smooth, shining, bay, pallid above; gills free, distant, connected by slight veins, white, then yellowish, growing pallid.—*A. & S. p.* 163. *B. & Br., Ann. N. H., No.* 1212. *Fr. Ep., p.* 105.
On bramble. Feb. Batheaston.

**Agaricus (Mycena) atro-cyaneus.** *Batsch.* "Dark-blue Mycena."
Fragile, inodorous; pileus membranaceous, campanulate, then convex, sulcate, covered with an evanescent white powder; umbo irregular, obtuse; stem straight, filiform, dark-blue, base villose, somewhat bulbous, gills attenuated, adnexed, lanceolate, distant, whitish.—*Batsch., f.* 87. *B. & Br., Ann. N. H. No.* 1213. *Fr. Ep.* 109.
On the ground. Nov. Ascot.
Pileus 3-5 lines broad, brownish, then grey, becoming bluish.

# Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY, AND ITS LITERATURE.

## BRITISH FUNGI.

*By* M. C. Cooke. *(Continued from p.* 74.*)*

**Agaricus (Mycena) ammoniacus.** *Fr.* "Strong-scented Mycena."

Strong scented; pileus membranaceous, conical, then expanded, umbonate, naked, discoid, opaque; paler at the margin and striate; stem rather firm, even, smooth, dry, rooting; gills adnate, linear, distinct, whitish.—*Fr. Ep. p.* 109. *Fr. Obs. ii., p.* 155. *B. & Br. N. H. No.* 1214.

On the ground. Oct. Lyndhurst.

Pileus normally brown or blackish, sometimes cinereous; stem not yellowish, 2 in. long, $\frac{1}{2}$ line thick.

**Agaricus (Mycena) peltatus.** *Fr.* "Peltate Mycena."

Pileus rather firm, convex, then plane, obtuse, densely striate to the middle, disc somewhat fleshy orbicular, even, plane; stem even, smooth, villous below; gills with a decurrent tooth, crowded, ventricose, grey, with the edge paler.—*Fr. S. M. i. p.* 145. *Fr. Epic. p.* 110. *Br. Bath Trans.* 1870, *p.* 64. *Ag. ambustus, Secr., No.* 927.

Amongst moss. Warleigh Down.

Inodorous. Pileus $\frac{3}{4}$ in. broad, dark brown when moist, when dry becoming somewhat depressed at the centre, and paler.

**Agaricus (Mycena) sacchariferus.** *B. & Br.* "Sparkling Mycena."

Whitish. Pileus hemispherical, stem short, filiform; gills few, rather thick, sprinkled with shining granules.—*B. & Br., Ann. N.H., No.* 1216. *Br. Bath Trans.* 1870, *p.* 64.

On bramble and nettle stalks. March. Batheaston.

Pileus 2 lines broad; stem 2 lines high, fixed at the base by a few flocci; gills 8-9, very distant, arcuato-decurrent, their margin and even the surface granulated. Allied to *A. tenerrimus*, which has crystalline particles on the pileus, but the gills are free and ventricose. *B. & Br.*

**Agaricus (Omphalia) leucophyllus.** *Fr.* "White-gilled Omphalia."

Pileus submembranaceous, infundibuliform, becoming even, not floccose, dark cinereous, margin reflexed, involute; stem stuffed,

then fistulose, rather rigid, equal, even, smooth, cinereous; gills decurrent, rather distant, arcuate, distinct, whitish.—*Fr. in Vet. Ac. Förh.* 1851. *Fr. Mon. Hym. i. p.* 183. *B. & Br. Ann. N. H. No.* 1217.

Amongst short grass. Coed Coch.

Stem $1\frac{1}{2}$ inch and more long, 1 line thick. Pileus about an inch across.

**Agaricus (Omphalia) rusticus.** *Pers.* "Rustic Omphalia."

Pileus membranaceous, slightly convex, umbilicate, striate, smooth, hygrophanous, when dry smooth and silky; stem somewhat stuffed, slender, smooth, greyish brown; gills decurrent, thick, rather distant, equally attenuated towards each extremity, grey, margin arcuate.—*Pers. Obs. i. t.* 4, *f.* 12. *B. & Br. Ann. N. H. No.* 1217, *bis.* *Fr. Ep. p.* 124.

On the ground. Sept. Coed Coch.

**Agaricus (Pleurotus) mutilus.** *Fr.* "Mutilated Pleurotus."

White, soft, pileus rather fleshy, versiform, when dry silky, becoming smooth; stem excentric, short, and sublateral, terete, erect, villous at the base; gills decurrent, narrow, rather thick, and somewhat crowded.—*Fr. S. M. i. p.* 191. *B. & Br. Ann. N. H. No.* 1221. *Fr. Epicr. p.* 134. *Batt. t.* IX. E.

On dead wood. Dec.

**Agaricus (Volvaria) medius.** *Fr.* "Intermediate Volvaria."

White, pileus fleshy, convexo-plane, obtuse, viscid, of one colour; margin even; stem solid, equal, smooth; volva lobed.—*Fr. Epicr. p.* 139. *Fl. Dan. t.* 1676. *Br. Bath. Trans.* 1870, *p.* 65.

In woods, &c. Warleigh Down.

**Agaricus (Clitopilus) vilis.** *Fr.* "Paltry Clitopilus."

Pileus rather membranaceous, convex, umbilicate, somewhat striate with silky flocci, soft, hygrophanous; stem hollow, thin, equal, fibrilloso-striate, grey; gills adnate, decurrent, crowded, whitish or greyish.—*Fr. Epicr. p.* 150. *Br. Bath. Trans. p.* 66.

In pine woods, amongst moss. Leigh Woods.

Stem 2-3 in high, about 1 line thick. Pileus about an inch broad.

**Agaricus (Leptonia) lappula.** *Fr.* "Bur-like Leptonia."

Pileus rather fleshy, convexo-plane, the darker umbilicus punctate with short erect fibrils; stem fistulose, slightly striate, lilac with a brown tint, apex naked, punctate with black; gills adnate, seceding, ovate, crowded, whitish.—*Fr. Ep. p.* 152. *B. & Br. Ann. N. H. No.* 1225.

Amongst leaves of beech. Forres.

**Agaricus (Leptonia) solstitialis.** *Fr.* "Solstitial Leptonia."

Pileus rather fleshy, depressed, papillate in the centre, rugulose, obsoletely clad with innate fibrils; stem somewhat hollow, smooth, smoky; gills emarginate, broad, whitish.—*Fr. Ep. p.* 152. *B. & Br. Ann. N. H. No.* 1226.

Amongst stones by the side of Lake Ceneord, Aberdeenshire. Sept.

**Agaricus (Leptonia) lazulinus.** *Fr.* "Bright-blue Leptonia."
Pileus submembranaceous, campanulate, then expanded, obtuse, discoid, at first even, striate when moist; stem fistulose, smooth, nearly of a cœrulean blue; gills adnate, crowded, equally attenuated, pale bluish.—*Fr. Ep. p.* 143. *B. & Br. Ann. N. H.* No. 1227. *Pers. Ic. Pict. t.* 4. *f.* 3, 4.
On the ground amongst grass. Sept. Aber.

**Agaricus (Nolanea) mammosus.** *Fr.* "Mammose Nolanea."
Pileus somewhat membranaceous, conico-campanulate, papillate, striate, smooth, hygrophanous; when dry isabelline and silky; stem fistulose, rigid, polished, even, smooth, mealy at the apex; gills affixed, seceding, rather crowded, grey.—*Fr. Epicr. p.* 156. *Bull, t.* 526. *Br. Bath. Trans.* 1870, *p.* 66. *Batsch. f.* 5.
In meadows. Chippenham.
Pileus brown. Stem elongated, fragile, shining.

**Agaricus (Nolanea) verecundus.** *Fr.* "Modest Nolanea."
Pileus campanulate, then convex; disc fleshy, smooth, somewhat umbonate, about the thin margin striate and flocculose; stem fistulose, rather firm, growing pale, mealy at the apex; gills adnate, whitish.—*Fr. Spic. p.* 6. *Fr. Ep. p.* 158. *B. & Br. Ann. N. H. No.* 1228.
Amongst short grass. Sept. Aber.

**Agaricus (Stropharia) inunctus.** *Fr.* "Anointed Stropharia."
Pileus campanulate, then convexo-plane, covered with an evanescent gelatinous cuticle; stem attenuated downwards, white, floccoso-fibrillose below the ring; gills broad, adnate, purplish-brown. —*B. & Br. Ann. No.* 1229.
On rich ground. Ely, &c.
Pileus 2 in. across, fleshy, livid; stem 2½ in. high, ¼ in. thick, stuffed, composed of fibres; spores purplish-brown, ·00028 in. long. Resembles some states of *A. æruginosus*, but the spores are of a different colour and much smaller.—*B. & Br.*

**Agaricus (Pholiota) confragosus.** *Fr.* "Rugged Pholiota."
Pileus fleshy, thin, convexo-plane, obtuse, clad with flocculose scales, hygrophanous; margin striate; stem fistulose, equal, fibrillose below the membranaceous ring; gills adnate, very much crowded, rufous.—*Fr. Ep. p.* 169. *B. & Br. Ann. N. H. No.* 1232.
On an old fallen elm. Coed Coch.
Stem 3 in. long, about 2 lines thick. Subcœspitose, fragile. Spores oblong, ferruginous (·0003 × ·00015 in.)

**Agaricus (Hebeloma) phæjocephalus.** *Bull.* "Bullard's Hebeloma."
Pileus subcampanulate, rarely flattened and umbonate, fuliginous, becoming brownish, smooth; stem thick, swollen at the base, naked, straight, grey with brownish lines, white at the base; gills free, semilunate, very broad, yellowish bistre colour.—*Bull. t.* 555. *f.* 1. *B. & Br. N. H. No.* 1233.
Oct. Near Wellington.
Pileus 2-4 in. broad; stem 3-5 in. high, 4-7 lines thick. The spores are bright ferruginous red.

**Agaricus (Hebeloma) calamistratus.** *Fr.* "Crispate Hebeloma."
Pileus fleshy, thin, campanulate, obtuse, stem solid, rigid, base sky blue, squarrose everywhere with rigid recurved scales; gills adnexed, whitish, then ferruginous.—*Fr. S. M. i. p.* 256. *B. & Br. Ann. N. H. No.* 1234. *Fr. Epicr. p.* 171.

In fir woods. Sept. Luggela, Wicklow.

A noble species, remarkable for the blue colour of the base of the stem. Spores ·0005 in. long, smooth.

Agaricus (Hebeloma) geophyllus. *Sow.* Var. lateritius. —*B. & Br. Ann. N.H. No.* 1234.*

This curious form, if it is really the same species, has been sent to us by Mr. Jerdon from Jedburgh. When dry it retains its brick-red colour. *B. & Br.*

**Agaricus (Hebeloma) scabellus.** *Fr.* "Ragged-cap Hebeloma."
Pileus rather fleshy, campanulate, then plane, when dry lacerated into scales or fibrils, umbo obtuse, even, smooth; stem somewhat stuffed, thin, smooth, growing pale, pruinose at the apex; gills adnexed, ventricose, rather distant, pallid.—*Fr. Epicr. p.* 177. *Fr. S. M. i. p.* 259. *B. & Br. Ann. N. H. No.* 1235.

Amongst short grass. Oct. Little Ormes Head.

Pileus chestnut, sericeo-squamulose; stem white, pruinose at the apex; gills ventricose, adnexed, ascending, pallid.

**Agaricus (Hebeloma) firmus.** *Pers.* "Firm Hebeloma."
Pileus viscid, gibbous, smooth; stem not attenuated, brown downwards and within; gills thin, slightly sinuated behind, cinnamon brown.—*Pers. Ic. & descr. t.* 5, *f.* 3, 4. *B. & Br. Ann. N. H. No.* 1236. *A. clavus, Batsch. f.* 199.

In fir woods. Sept. Gwrwch, Denbighshire.

Taste not bitter, smell raphanoid. Colour exactly as in Batsch's figure.

**Agaricus (Hebeloma) elatus.** *Batsch.* "Elevated Hebeloma."
Pileus fleshy, convexo-plane, obtuse, even, smooth, rather viscid; stem stuffed, elongated, cylindrical, twisted, adpressedly fibrillose, apex farinaceous, growing pale; gills rounded, crowded, dry, pale ferruginous.—*Batsch. f.* 108. *B. & Br. Ann. N. H. No.* 1238. *Fr. Epicr. p.* 181.

Amongst pine leaves.

Odour very strong; stem 4 in. long, 4 lines thick. Pileus orbicular, 3 in. broad, tan colour, margin thin; gills 3 lines broad, unspotted.

**Agaricus (Hebeloma) Hongardii.** *Weinm.* "Bongard's Hebeloma."
Pileus rather fleshy, campanulate, obtuse, disc squamose, torn and fibrillose about the margin; stem solid, rigid, pale rubescent, reddish silky below, apex sprinkled with a whitish powder; gills adnate, ventricose, broad, pale reddish, then cinnamon.—*Weinm. p.* 190. *Fr. Epicr. p.* 173.

On sandhills. Forres. (J. K.)

With the odour of Bergamot. Stem 2-3 in. long, 2 lines thick.

Pileus 1-1½ in. broad, fuscescent when moist, pallid when dry, not rimose.

**Agaricus (Hebeloma) lanuginosus.** *Bull.* "Woolly Hebeloma."
Pileus rather fleshy, hemispherical, then expanded, obtuse, floccoso-squamulose, the scales of the disc erect and squarrose; stem solid, thin, squamose, fibrillose, with a whitish powder above; gills seceding, thin, denticulate, pallid clay colour.—*Bull. t.* 370. *Br. Bath. Trans.* 1870. *p.* 67. *Fr. Epicr. p.* 171.
On the ground. Near Bristol.

**Agaricus (Hebeloma) uniformis.** *P.* "Uniform Hebeloma."
Pileus rather fleshy, convex, umbonate, piloso-squamose, stem somewhat hollow, fibrillose and squamulose, farinaceous at the apex; gills arcuate, affixed, ventricose, pallid olivaceous.—*Pers. Icon. Pict. t.* 15. *f.* 1. *Br. Bath Trans.* 1870. 67. *A. dulcamarus. Fr. Epicr. p.* 171.
In fir plantations. Bathford.

**Agaricus (Flammula) mixtus.** *Fr.* "Mixed Flammula."
Pileus fleshy, convex, then plane, obtuse, viscid; disc darker, rugulose; stem hollow, curved, pallid, with brownish fibrils, and rufous scales below; gills subdecurrent, crowded, pale clay colour. —*Fr. Ep. p.* 185. *B. & Br. Ann. N. H. No.* 1239. *bis.*
On the ground in pine woods. (*C. E. B.*)
Stem 1-3 in. long, 3-4 lines thick, somewhat flexuous, incrassated at the base. Pileus 1-2 in. broad, margin paler.

**Agaricus (Flammula) alnicola.** *Fr.* "Alder stem Flammula.'
Pileus fleshy, convexo-plane, moist, even; from the first rather fibrillose or squamose, sometimes smooth; stem somewhat hollow, attenuated and rooting, fibrillose, yellow, becoming ferruginous; gills sub-adnate, broad, pallid, then ferruginous.—*Fr. S. M. i. p.* 250. *Fr. Epicr. p.* 187. *B. & Br. Ann. No.* 1242.
On stumps of various trees. Epping.

**Agaricus (Flammula) conissans.** *Fr.* "Tan-coloured Flammula."
Pileus fleshy, thin, convex, then plane, equal, smooth when moist; stem hollow, silky-fibrillose, pallid; gills adnate, thin, very much crowded, dingy pallid, becoming clay-coloured.—*Fr. Ep. p.* 187. *Bull. t.* 178. *B. & Br. Ann. N. H. No.* 1243.
On dead stumps.
Often confounded with *A. fascicularis*, but with differently coloured gills and spores. Pileus yellowish-tan, rather viscid.

**Agaricus (Flammula) lubricus.** *Fr.* "Slippery Flammula."
Pileus fleshy, convex, then plane, even, viscid; stem solid, rather attenuated, fibrillose, whitish, apex striate; gills adnate, broad, pallid, then clay-coloured.—*Fr. S. M. i. p.* 252. *Fr. Epicr. p.* 185. *B. & Br. Ann. N. H. no.* 1245.
On trunks. Tunbridge Wells.

**Agaricus (Naucoria) semiflexus.** *B. & Br.* "Half-turned Naucoria."
Pileus hemispherical, chestnut colour, hygrophanous, margin fringed with a delicate white veil; flesh white; stem semi-hori-

zontal, solid; gills distant, adnexed, brownish; spores echinulate. —*B. & Br. Ann. N. H. No.* 1246.

On the side of a bank. Oct. Ascot.

Pileus $\frac{1}{2}$ in. across, subcampanulate, then hemispherical, or flattened above, moderately fleshy; stem $\frac{3}{4}$ in. high, $\frac{2}{3}$ line thick; spores oblong, ·0003-·0004 long, ·00025-·0003 in. wide. Allied to *A. horizontalis. B. & Br.*

**Agaricus (Naucoria) scolecinus.** *Fr.* "Rusty Naucoria."

Pileus rather fleshy, campanulate, then convex or plane, smooth, margin slightly striate; stem fistulose, equal, ferruginous, or rufous-ferruginous, sprinkled with white meal; gills adnate, rather distant, pale flesh colour, then ferruginous, edge flocculose.—*Fr. Ep. p.* 194. *B. & Br. Ann. N. H. No.* 1247.

On moist ground under alders. Sept. Powerscourt.

Spores apiculate, ·0003 in. long, .0013 in. wide; stem 2-3 in. long, 1 line thick; pileus $\frac{1}{2}$-$\frac{3}{4}$ in. broad, ferruginous bay, paler at the margin.

**Agaricus (Naucoria) tenax.** *Fr.* "Tough Naucoria."

Pileus somewhat fleshy, campanulate, then expanded, smooth, slightly viscid, hygrophanous, stem stuffed, then hollow, equal, yellow, brownish, slightly striate with adpressed fibrils; veil fugacious; gills adnate, rather distant, edge whitish.—*Fr. S. M. i. p.* 290. *Weinm. p.* 262. *Fr. Epicr. p.* 198. *B. & Br. Ann. N. H. No.* 1248.

On sticks in a ditch. Oct. Welford, Norths.

Pileus cinnamon, ochraceous when dry; stem becoming ferruginous or olivaceous; gills pallid, olivaceous, becoming ferruginous.

**Agaricus (Naucoria) crobulus.** *Fr.* "Scaly Naucoria."

Pileus rather fleshy, convexo-plane, obtuse, with whitish evanescent floccose scales, then smooth; stem fistulose, brown, with whitish scales, gills adnate, decurrent, crowded, ferruginous, brown. —*Fr. S. M. i. p.* 200. *Fr. Epicr. p.* 200. *B. & Br. Ann. N. H. No.* 1249.

In a ditch amongst fragments of sticks. Oct. Welford, Norths.

Pileus slightly viscid, scarcely striate, when dry tan-coloured, rather shining.

**Agaricus (Galera) rubiginosus.** *Pers.* "Rubiginous Galera."

Pileus membranaceous, campanulate, obtuse, everywhere sulcate or striate, hygrophanous; stem filiform, equal, thin, shining, smooth, rubiginous; gills adnate, ascending, distant, broad, opaque. —*Pers. syn. p.* 385. *B. & Br. Ann. N. H. No.* 1252. *Fr. Epicr.* 206. *Mich. Gen. t.* 75. *f.* 8.

Amongst moss. Sept. Kew.

Pileus cinnamon or honey-coloured, tan colour when dry; stem 2 in. long, flexile.

**Agaricus (Psalliota) merdarius.** *Fr.* "Dung Psalliota."

Pileus convexo-plane, obtuse, smooth, moist, hygrophanous; stem hollow, tough, short, flocculose when dry, and pallid; ring

lacerated, fugacious; gills adnate, broad, yellowish, then umber.—*Fr. S. M. i. p.* 291. *B. & Br. Ann. No.* 1255. *Fr. Epicr. p.* 220. *Weinm. p.* 253. *Buxb. C.* 4. *t.* 16. *f.* 2.

On dung. Oct. Sibbertoft.

Densely gregarious. Pileus moist, prettily edged with the remains of the veil, $\frac{1}{2}$-1 in. across; stem $\frac{1}{2}$-$\frac{1}{3}$ in. high.—*B. & Br.*

**Agaricus (Hypholoma) leucotephrus.** *B. & Br.* "White-capped Hypholoma."

Cæspitose. Pileus at first pallid, subcampanulate, rugose, then convex, expanded, whitish; stem silky-fibrillose below, apex striate, or between sulcate and striate, fistulose; ring broad, here and there appendiculate; gills narrow, at first cinereous-white, slightly adnate, then grey, nearly black.—*B. & Br. Ann. N. H. No.* 1256.

In large masses at the base of ash trees. Oct. North Kilworth.

Pileus 3 in. across; stem 4 in. high, 5 lines thick; gills $1\frac{1}{2}$ line broad; spores ·00028 in. long ·00019 in. wide, very dark brown purple. Clearly different from *A. Candollianus* and *A. appendiculatus, Fr.* The pileus is not of a rich brown when young, nor are the gills when old at all brown.—*B. & Br.*

**Agaricus (Psilocybe) agnarius** *Fr.* "Whitish Psilocybe."

Pileus conical-convex, then expanded, whitish, then becoming cinereous, not hygrophanous, subumbonate, between sulcate and striate; flesh white; stem flexuous, fistulose, white; gills rather distant, somewhat broad, briefly adnate or adnexed, cinereous.—*Fr. MSS. B. & Br. Ann. N. H. No.* 1257.

About the roots of decayed trees. Oct. North Kilworth, Leicestershire.

Allied to *A. coprophilus.* In colour the pileus somewhat resembles *Hygrophorus ovinus.*

**Agaricus (Panæolus) acuminatus.** *Fr.* "Acuminate Panæolus."

Pileus rather fleshy, conic, acuminate, even, smooth, shining, zoned about the margin with a blackish line; stem thin, equal, pruinose, bicolored; gills adnexed, ventricose, crowded, becoming blackish. *Fr. Epicr. p.* 237. *Batt. t.* 22. *F. B. & Br. Ann. N. H. No.* 1258.

On dung. Oct. Sibbertoft.

Exactly accords with Batarra's figure, which scarcely agrees with the specific name. *B. & Br.*

**Agaricus (Psathyrella) subatratus.** *Batsch.* "Blackish Psathyrella."

Pileus rather membranaceous, campanulate, then expanded, umbonate, striate, rugulose, sprinkled with pruinose atoms; stem straight, rather firm, shining with a silky lustre, naked; gills adnexed, fuliginous, becoming black.—*Batsch. f.* 89. *B. & Br. Ann. N. H. No.* 1260. *Fr. Epicr. p.* 238.

In grassy places. Sept. Batheaston.

Pileus rufescent, growing pale, scarce exceeding 1 in. broad. Stem $1\frac{1}{2}$ line thick, clad with whitish down at the base.

**Agaricus (Psathyrella) caudatus.** *Fr.* "Caudate Psathyrella."

Pileus membranaceous, conico-campanulate, striate, hygrophanous, even when dry; stem elongated, somewhat attenuated from the rooting base, at length twisted; gills adnate, cinereous, becoming black.—*Fr. Obs. ii. p.* 187. *Fr. Ep. p.* 239. *B. & Br. Ann. N. H. No.* 1261, *Paul. t.* 124. *f.* 1. 2.

Amongst the stumps of a wooden pavement. Sept. Sibbertoft.

A small form. Pileus at first sienna brown, at length whitish, often transversely cracked; stem at first white, fibrillose; gills ventricose, adnate. *B. & Br.*

**Agaricus (Psathyrella) empyreumaticus.** *B. & Br.* "Empyreumatic Psathyrella."

Pileus expanded, hygrophanous, sprinkled with atoms, rufous, growing pale; stem elongated, between silky and scurfy, pallid, narrowly fistulose; gills broad, thick, distant, adnate with a decurrent tooth, rufous, with a pallid edge.—*B. & Br. Ann. N. H. No.* 1262.

On a wooden pavement. Oct. Sibbertoft.

Pileus $1\frac{1}{2}$ in. across, margin crenate; stem $2\frac{1}{2}$ in. high, $1\frac{1}{2}$ line thick, narrowly but distinctly fistulose; gills 2 lines broad, connected by veins, rufous, then brown-purple; spores black. Resembling *A. confragosus* so closely that, till the spores were observed, it was taken for that species.—*B. & Br.*

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## ON THREE NEW SPECIES OF AGARICUS FROM A STOVE.

*By* the Rev. M. J. Berkeley, M.A., F.L.S.

It is pretty certain that most of the Hymenomycetous fungi which occur in stoves are of exotic origin. *A. cepæstipes* and an allied similarly coloured species, which are the produce of our hothouses, occur naturally in hot countries, and have never been found wild in Europe, and the same may be said of some others. The three species at present described appear to be quite new, and one of them is amongst the most interesting of the genus.

1. **Agaricus (Collybia) Dorotheæ.** *B.*

Pileo primum subgloboso fusco, dein applanato subumbonato pallidiore, demum depresso usque ad centrum radiato-sulcato granulato, setulis brevibus candidis sparso; margine crenato; stipite basi fibrilloso luteo vel rufo, sursum candicante velut pileus granuloso-hispidulo setuloso; lamellis candidis distantibus adnexis leviter ventricosis postice connexis, acie integra.

On a dead fern stem from Jamaica, in a hothouse at Dangstein. Lady Dorothy Nevill.

Pileus at first globose, dark brown, then flatly hemispherical, at

length expanded, with a slight umbo, and eventually depressed, pale brown, an inch or more across, radiated, sulcate from the crenate margin almost to the centre, granulated, beset with short white bristles, which in the young state point in every direction. Stem 2-2½ inches high, scarcely a line thick, at first brownish above, white below, with a minute disc-like swelling at the base, then yellowish or rufous below and white above, granulated like the pileus and beset with white bristles. Gills white, distant, adnexed, slightly ventricose, connected behind; edge quite entire.

2. **A. (Collybia) caldarii.** *B.*

Pileo hemispherico umbonato brunneo rugoso non expallente; stipite brunneolo læri extus cartilagineo; lamellis adnato-decurrentibus subcinereis, interstitiis marginem versus venosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus hemispherical, umbonate, brown, rugose, not turning pale; ½ an inch across; stem paler, even, cartilaginous externally; 2 inches high, not a line thick; gills adnato-decurrent, somewhat ash-colored, interstices near the margin veined.

3. **A. (Omphalia) Nevillæ.** *B.*

Pileo hemisphærico brunneo depresso rugoso striato minute granulato; margine tenuissimo, pallescente impunctato; stipite pallidiore nigro-granulato albo-farcto, basi subdilatato villoso-strigoso; lamellis candidis arcuato-decurrentibus, interstitiis lateribusque venoso-rugosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus ½ an inch across, brown, hemispherical, depressed in the centre, rugose, minutely granulated, striate, growing pale, when parting with its moisture, towards the margin, which is not dotted like the centre; stem 1 inch high, not a line thick, brownish, stuffed, white within, rough with black granules, rather dilated at the base, and clothed with villous hairs; gills white, arcuato-decurrent; interstices and sides venoso-rugose.

Somewhat resembling *A. affricatus*, but not infundibuliform nor variegated with pilose scales, while the gills are white, not cinereous.

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Professor H. L. Smith's Conspectus.—I have just received a communication from my friend the author, calling my attention to one or two errors in my notice of his work. He says—"I did not intend to place all the Triceratiæ among the Biddulphiæ, for a large number of them belong among the Coscinodisceæ. . . . . It is true this does not appear clearly in the Conspectus as it now stands, but this was my idea."*

*Tetracyclus*, Ralfs. should have been referred to *Biblarium*, Ehr.

F. Kitton.

* Professor Smith informs me that an addenda will shortly be published.

# BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from p. 88.)*

**Cortinarius (Phlegmacium) triumphans.** *Fr.* "Magnificent Cortinarius."

Pileus fleshy, convex, then plane, viscid, even, at first spotted with evanescent darker adpressed scales; stem solid, clavate, concentrically squamose beneath the ring; gills emarginate, quite entire, crowded, pallid, then clay-coloured.—*Fr. Epicr. p.* 256. *B. & Br. Ann. N. H., No.* 1263. *Cortinarius sublanatus. Hussey Myc. Illus.* ii. t. 22.

In woods.

A large species. Pileus yellowish.

**Cortinarius (Myxacium) pluvius.** *Fr.* "Pluvial Cortinarius."

Pileus rather fleshy, globose, then convex, smooth, viscid, hygrophanous; stem stuffed, then hollow, slender, nearly equal, soft, white, becoming pallid; gills decurrent, then seceding, white, then ochraceous.—*Fr. Sys. Myc. i.*, 36. *Fr. Epicr. p.* 277. *B. & Br. Ann. N. H., No.* 1267. *Secr. No.* 265.

In woods. Lea. Sept.

Pileus $\frac{1}{2}$-1 in., stem sometimes short, sometimes 3 in. long, 2-3 lines thick. Gills at length free, pallid.

**Cortinarius (Dermocybe) anthracinus.** *Fr.* "Fiery-gilled Cortinarius."

Pileus innato-fibrillose, brownish cinnamon; stem fibrilloso-striate, pallid; gills very much crowded, narrow, fiery-yellow, blood-red when rubbed.—*Fr. Epicr. p.* 288. *B. & Br. Ann. N.H., No.* 1269.

In a wood. Coed Coch.

Certainly different from *C. sanguineus*. The Welsh plant exactly accords with a drawing from Fries. *B. & Br.*

Stem 2 in. long, 1-2 lines thick.

**Cortinarius (Dermocybe) orellanus.** *Fr.* "Red fleshed Cortinarius."

Pileus fleshy, obtusely umbonate, villoso-squamulose or fibrillose, tawny orange, flesh reddish; stem solid, firm, nearly equal, striato-fibrillose, tawny; gills adfixed, broad, rather distant, at length opaque.—*Fr. Epicr. p.* 288. *B. & Br. Ann. N. H. No.* 1270.

On the ground in a wood. Coed Coch. Oct.

With *C. cinnamomeus*, to which it is nearly related, but very distinct.

**Cortinarius (Telamonia) bivelus.** *Fr.* "Twin-veiled Cortinarius."

Pileus fleshy, convex, then plane, obtuse, smooth, or silky at the margin, brick red, becoming tawny; stem firm, rather bulbous, dirty whitish; spurious ring fugacious; gills adnexed, scarcely crowded, bright tawny cinnamon.—*Fr. Epicr. p.* 292. *B. & Br. Ann. N.H. No.* 1271. *Fr. Obs.* ii. 58. *Fr. Sys. Myc.* i. 215.

In woods. Coed Coch. Oct.

Pileus soft, bibulous, moist, but not truly hygrophanous.

**Cortinarius (Telamonia) incisus.** *Fr.* "Incised Cortinarius."

Pileus rather fleshy, between conical and convex, at length plane, umbonate, naked, soon innato-fibrillose or squamose, hygrophanous; stem somewhat stuffed, equal, fibrillose with ferruginous fibrils, veil interwoven into a ring, or obsolete; gills adnate, distinct, scarcely crowded, cinnamon becoming ferruginous.—*Fr. Epicr. p.* 301. *B. & Br. N.H., No.* 1272. *Fr. Sys. Myc.* i. 213. *Bull. t.* 586, *f.* 2.

On the ground. Loughborough.

Gregarious. Stem 1 in. high, 1-2 lines thick. Pileus ferruginous tawny, olivaceous brown or brownish when young.

**Cortinarius (Telamonia) hæmatochelis.** *Fr.* "Blood-cinctured Cortinarius."

Pileus fleshy, thin, silky or fibrillose, brownish or pallid testaceous; stem solid, attenuated upwards, with a rufous zone below the middle, gills adnate, crowded, rather narrow, pallid cinnamon. —*Fr. Epicr. p.* 302. *Huss. Illust. vol. i. t.* 19. *Bull, t.* 527, *fig.* 1? *B. & Br. Ann. N.H., No.* 1273.

In woods. Coed Coch. Oct.

**Cortinarius (Hygrocybe) subferrugineus.** *Fr.* "Rusty Cortinarius."

Pileus fleshy, convex, then expanded, obtuse or gibbous, becoming smooth, testaceous grey, becoming ferruginous, rather hygrophanous; margin thin, stem solid, spongy, rigid externally, stout, somewhat bulbous, whitish, then dingy white, fibrillose veil fugacious; gills emarginate, scarcely crowded, broad, opaque, pallid, then becoming ferruginous.— *Fr. Epicr. p.* 303. *Batsch. El. f.* 186. *B. & Br. Ann. N.H., No.* 1275. *Fr. Sys. Myc.* i. 234. *Weinm. p.* 157.

In woods. Coed Coch. Sept.

Odour and taste unpleasant.

**Cortinarius (Hygrocybe) obtusus.** *Fr.* "Obtuse Cortinarius."

Pileus submembranaceous, conico-campanulate, striate to the middle, flesh coloured; stem hollow, soft, ventricose, adpressedly fibrillose, growing pallid; gills adnato-ventricose, rather distant, tawny cinnamon, edge fringed with white.—*Fr. Epicr. p.* 313. *Fr. Sys. Myc.* i. 233. *B. & Br. Ann. N. H., No.* 1274. *Weinm. p.* 183. *Secr. No.* 247.

In woods. Coed Coch. April.

**Paxillus filamentosus.** *Fr.* "Filamentose Paxillus."

Pileus fleshy, excentric, gibbous, at length depressed, torn into dense villous scales; margin thin, inflexed; stem solid, attenuated downwards, sub-incurved; gills crowded, narrow, straight, white, then yellowish, simple behind.—*Fr. Epicr. pp.* 317. *Buxb.* iv. *t.* 8, *f.* 1.

On the ground. Aug. Forres.

Stem from an inch in length, and $\frac{1}{2}$ in. thick, lateral. Pileus $1\frac{1}{2}$-3 in. broad, tawny-yellowish. Gills decurrent, at length becoming darker.

## TWO SPECIES OF PEZIZA.*

*By* Worthington G. Smith, F.L.S.

**Peziza (Humaria) Chateri.** *Sm.* "Chater's Peziza."

Cups concave, at length expanded, margin incurved, sessile, bright orange-red within, pale brown externally, from the colour of the cells of the cup, asci cylindrical; sporidia elliptic, binucleate, epispore rough. Paraphyses clavate above.—*W. G. Smith, in Gard. Chron.*, No. 1 (1872). *with fig. Rabh. Fung. Eur.*, *No.* 1517.

On the ground.

Cups 1 to 6 lines across, composed of clavate, pale brown, septate cells, the tips of which give a granulated appearance to the outer surface, which is otherwise smooth.

(Pl. viii., fig. 1. 2.)

**Peziza (Mollisia) Bulliti.** *Sm.* "Bull's Peziza."

Cups subhemispherical, at length irregular, sessile, or very shortly stipitate, whitish, margin inflexed, rather pulverulent from the remains of the veil, hymenium often proliferous, mycelium brownish, asci subclavate, sporidia sub-elliptic, minute.—*W. G. Smith, in Gard. Chron.*, (1873). *with fig. B. & Br. Ann. N. H.*, *No.* 1324, *t.* 19, *f.* 17.

On a wooden cistern. Dec.

Sporidia ·0002-·0003 in. long.

(Pl. viii., fig. 3.)

* For the use of the figures illustrating this communication, we are indebted to the *Gardener's Chronicle*.

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showing that their silicious deposit conforms to the general plan of deposition in simpler forms, by Henry J. Slack, F.G.S.

Hedwigia, No. 10 (1872), contains "Pyrenomycetes novi Austriaci," by George Winter.

Pilze an Quittenästen, von Stefan Schulzer von Müggenburg, in Verh. d. Zool. Bot. Gess in Wien, xxi., 1871, abstracted in Hedwigia, No. 10 (1872).

Notes on the Lichens in Sowerby's Herbarium, Part ii., by Rev. J. M. Crombie, M.A., F.L.S., in "Journal of Botany," for Dec., 1872.

Recent Researches in the Diatomaceæ, Part v., by the Rev. Eugene O'Meara, A.M., in "Journ. Bot.," Dec., 1872.

The Mosses of Oxfordshire and the Neighbourhood of Oxford, by Henry Boswell, in "Journ. Bot.," Dec., 1872.

Blights on Tea and Coffee, by M. C. Cooke, in "Gardener's Chronicle," Nov. 30, 1872. pp. 1588.

FIG. 1.

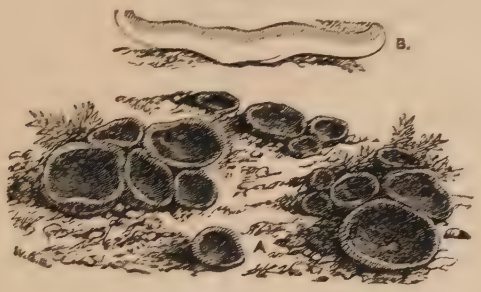



FIG. 2.

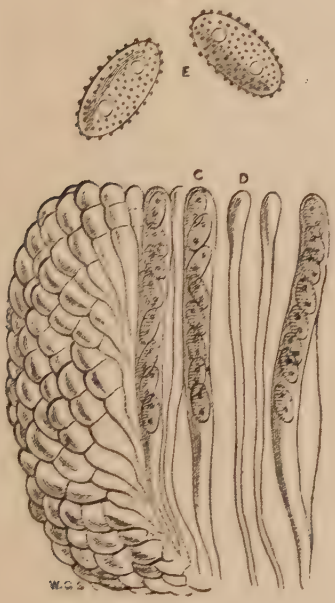
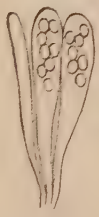
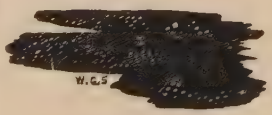



FIG. 3.




FIGS. 1, 2, PEZIZA CHATERI *Sm.*
„ 3, PEZIZA BULLII. *Sm.*

# Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY, AND ITS LITERATURE.

## BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from p.* 111.*)*

**Hygrophorus limacinus.** *Fr.* "Slimy Hygrophorus."

Pileus fleshy, convex, then plane, smooth, glutinous, umber, then fuliginous; margin paler; stem solid, firm, ventricose, fibrillose-striate, viscid, squamulose above; gills rather thin, white, then cinereous.—*Fr. Epicr. p.* 324. *B. & Br. Ann. N. H., No.* 1277. *Paul, t.* 77, *f.* 3.

In woods, &c. St. Leonards.

**Hygrophorus caprinus.** *Fr.* "Streaky Hygrophorus."

Pileus fleshy, fragile, conical, then flattened, and umbonate; at length depressed, subrepand, moist, streaky, as well as the stem, which is solid, fibrillose, fuliginous; gills deeply decurrent, thick, scarcely distant, white, then glaucous.—*Fr. Epicr. p.* 326. *B. & Br. Ann. N.H., No.* 1278.

In pine woods. Near Bath.

**Hygrophorus turundus.** *Fr. Epicr. p.* 330. *Ag. superbus.* Lasch in Linn. iii. No. 118.

Var. **mollis.**—*B. & Br.* Golden yellow; pileus nearly plane, at length slightly depressed, clad with short radiating soft hairs of the same colour; stem equal, stuffed; gills distant, arcuate, decurrent.—*B. & Br. Ann. N.H., No.* 1279.

In plantations on the naked soil. Coed Coch. Oct.

Pileus $\frac{1}{2}$-$\frac{3}{4}$ in. across; stem 1-1$\frac{1}{4}$ in. high, 1-2 lines thick; gills narrow.

**Hygrophorus irriguus.** *Fr.* "Moist Hygrophorus."

Pileus rather fleshy, campanulate, then expanded, somewhat umbonate, even; stem fistulose, equal, tough, smooth, viscid, livid; gills rather decurrent, somewhat distant, whitish.—*Fr. Epicr. p.* 329. *B. & Br. Ann. N.H., No.* 1280.

In grassy pastures. Laxton, Northants. Oct.

**Russula nauseosa.** *Fr.* "Nauseous Russula."

Rather mild, strong scented, fragile; pileus fleshy, thin, plane, rather swollen, then depressed and infundibuliform, viscid; disc darker, margin sulcate, submembranaceous, stem stuffed, rather striate, white; gills adnexed, ventricose, somewhat distant, yellow, then dingy ochre.—*Fr. Epicr. p.* 363. *B. & Br. Ann. N. H., No.* 1283.

In pine woods. Coed Coch. Bowood. Oct.

**Lentinus resinaceus.** *Trog.* "Gummy Lentinus."

Pileus somewhat fleshy, slightly excentric, villous, rather gummy, ochraceous cinnamon, stem unequal, tomentose, gills crowded, serrated, whitish.—*Trog. Reg. Bot. Zeit.*, 1832, *p.* 525. *B. & Br. Ann. N. H., No.* 1283.* *Fr. Epicr. p.* 391.

On trunks. Forres, N.B.

**Boletus collinitus.** *Fr.* "Ringless yellow Boletus."

Pileus pulvinate, even, with an evanescent tawny gluten, growing pale, stem firm, rather attenuated downwards, ex-annulate, white, then becoming brownish, somewhat reticulated with adpressed scales, pores adnate, elongated, didymous, pallid, then yellow, mouth naked.—*Fries. Epic.* 410. *B. & Br. Ann. N. H., No.* 1284.

In fir woods. Ascot. Nov.

With the stature and color of *B. luteus*, but absolutely ex-annulate.

**Boletus pruinatus.** *Fr.* "Brown mealy Boletus."

Pileus convex, then plane, rigid, dry, becoming purplish-bay, smooth, sprinkled with an umber powder, stem firm, somewhat ventricose, even, smooth, yellow, or variegated with reddish, punctate at the base, tubes adnate, minute, pallid yellow.—*Fries. Epicr.* 414. *B. & Br. Ann. N. H., No.* 1285. *Bull. t.* 393, *f.* B. C.

On grassy ground. Kew, &c.

Pileus 2 in. and more broad, scarcely rimose, margin obtuse; flesh white, firm, reddish beneath the cuticle.

**Polyporus melanopus.** *Fr.* "Black-stemmed Polyporus."

Pileus between fleshy and tough, plane, then infundibuliform, white, then yellowish-brown, at first finely flocculose; stem excentric, rather velvety, incurved, thickened downwards, black; pores decurrent, short, minute, obtuse, unequal, white.—*Fr. Epicr. p.* 439. *Rostk. t.* 4. *Fr. Sys. Myc.* i. 347. *B. & Br. Ann. N.H., No.* 1286.

On dead wood. Scotland.

**Polyporus (Placodermei) populinus.** *Fr.* "Poplar Polyporus."

White, pileus between corky and woody, rigid, not zoned, villous, internally of the same colour; margin obtuse; pores minute, short, rounded.—*Fr. Epicr. p.* 472. *Fl. Dan. t.* 1791. *Fries. Sys. Myc.* i. 367. *B. & Br. Ann. N.H., No.* 1288.

On the trunk of a poplar. Lincolnshire.

Has very much the habit of *P. connatus.*

**Polyporus (Resupinatus) micans.** *Ehr.* "Glistening Polyporus."
Effused, thin, flesh-coloured, becoming whitish; circumference byssoid, whitish; pores honeycombed, angular, somewhat crenate.—*Ehr. Silv. Ber. p.* 30. *Fries. Epicr. p.* 484. *Fries. Sys. Myc.* i. 383. *B. & Br. Ann. N.H., No.* 1289.
On dead wood. Leigh Wood. Oct.

**Polyporus (Resupinatus) hibernicus.** *B. & Br.* "Irish Polyporus."
Wholly effused, not separable, white; margin thin, tomentose; pores small, angular; dissepiments rather rigid.—*B. & Br. Ann. N.H., No.* 1291.
On decorticated branches of fir. Co. Wicklow. Sept.
At first orbicular, then by confluence forming effused patches, with a narrow, very thin, tomentose margin; pores $\frac{1}{72}$in. across; dissepiments mostly entire. Apparently nearer to *P. radula* than to *P. vaporarius.*—*B. & Br.*

**Polyporus (Resupinatus) farinellus.** *Fr.* "Mealy Polyporus."
White, vaguely effused, thin, interwoven with a naked flocculoso-pulverulent mycelium; pores thin, contiguous, unequal, rather flexuous, intricate.—*Fries. Sys. Myc.* i. 384. *Fr. Epicr.* 487. *B. & Br. Ann. N.H., No.* 1292.
On beech. Dec.

**Trametes Bulliardi.** *Fr.* "Bulliard's Trametes."
Pileus corky, flattened, even, smooth, white then tawny, at length zoned; pores long, subrotund, unequal, pallid, then rufescent.—*Fries. Epicr.* 491. *B. & Br. Ann. N.H., No.* 1293. *Bol. suaveolens, Bull. p.* 342, *t.* 310.
On dead wood. Oct.

**Hydnum scrobiculatum.** *Fr.* "Furrowed Hydnum."
Ferruginous, pileus between corky and coriaceus, clavate, then plane or infundibuliform, pubescent; disc furrowed, squamose, zoned within, stem very short, naked, rooting; spines very short. —*Fries. Obs.* i. 143. *B. & Br. Ann. N. H., No.* 1294. *Mich. Gen. t.* 72, *f.* 7. *Bull. t.* 156, *var. a.*
In fir woods. Oct. Nov.

**Hydnum melaleucum.** *Fr.* "Black and white Hydnum."
Pileus coriaceus, thin, rigid, irregularly striate, as well as the slender, smooth stem, black; margin and spines white.—*Fries. Epicr.* 510. *B. & Br. Ann. N. H., No.* 1295. *Schoff. t.* 272.
In fir woods. Ascot.

**Hydnum cirrhatum.** *P.* "Cirrhose Hydnum."
Pileus fleshy, expanded, cirrhoso-fibrillose, pallid, margin fimbriate, incurved; spines very long, rather tough, equal.—*Pers. Syn.* 558. *Fries. Sys. Myc.* 411. *Fries. Epicr.* 513. *Flor. Dan. t.* 1789, *f.* 2. *Weinm. p.* 361.
On beech. Epping Forest. (J. English.)
At first whitish, then yellowish or rufescent.

**Hydnum bicolor.** *A. & S.* "Two-colored Hydnum."

Subiculum broadly effused, tomentose, adpressed, thin, white; spines minute, short, white, villose, apex naked, acute, rufous brown.—*Alb. & Schw. Consp.* 270. *Fries. Epicr.* 518. *Fr. Sys. Myc.* 417. *B. & Br. Ann. N. H.*, No. 1297.

On Bramble. Batheaston. March.

**Odontia barba-Jovis.** *Fr.* "Jupiter's beard Odontia."

Between byssoid and membranaceous, effused, separable, white, then yellowish, warts at first papillose, then conical, apices orange, fimbriate.—*Fries. Epicr. p.* 528. *B. & Br. Ann. N. H., No.* 1299. *Sow. t.* 328. *Bull. t.* 481, *f.* 2.

On decayed wood. Epping.

**Stereum frustulosum.** *Fr.* "Frustulose Stereum."

Woody, resupinate, tuberculose, crowded, and almost confluent, afterwards apparently broken up into frustules, beneath and around the margin smooth, bay-brown, becoming blackish, hymenium convex, cinnamon, growing pale, pruinose.—*Fries. Sys. Myc.* 445. *Fries. Epicr.* 552. *B. & Br. Ann. N. H., No.* 1300.

On hard oak wood. South of England.

**Solenia fasciculata.** *P.* "Fasciculate Solenia."

Gregarious, somewhat fasciculate, between clavate and cylindrical, becoming nearly smooth, white.—*Pers. Myc. Eur. t.* 12, *f.* 8-9. *B. & Br. Ann. N. H., No.* 1301, *t.* 18, *f.* 4. *Fries. Sys. Myc.* ii. 200. *Solenia candida. Moug. Exs. No.* 96. *Cooke Handbook*, 956. *Br. Bath Trans.* 1870, *p.* 90.

On rotten beech. Jan.

This was included in the Handbook in error, under the name of *Solenia candida.*

**Clavaria spinulosa.** *Pers.* "Spinulose Clavaria."

Stem rather thickened, short, pallid; branches elongated, crowded, straight, attenuated, approaching cinnamon colour.—*Pers. Obs.* ii. *t.* 3. *f.* 1. *B. & Br. Ann. N. H., No.* 1302. *Fries. Epicr. p.* 574.

In pine woods. Coed Coch.

Stem thick at the base, but not so thick as in Persoon's figure. *B. & Br.*

PTERULA. *Fr.*

Caulescent, coriaceus, apex at first fimbriate or compressed.—*Fr. Summ. Veg. Scan. p.* 339. *Fr. Sys. Myc.* iii., 285.

**Pterula multifida.** *Fr.* "Multifid Pterula."

*B. & Br. Ann. N. H., No.* 1304. Sept. 1865.

We have been unable at present to meet with a description of this plant.

# Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY, AND ITS LITERATURE.

## BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from p.* 116.*)*

### ASCOMYCETES.

**Peziza (Humaria) hinnulea.** *B. & Br.* "Brown Humaria."
Cup sessile, flexuose, marginate, bay-brown, between fleshy and waxy; sporidia globose, even with a large globose nucleus.—*B. & Br. Ann. N. H., No.* 1320.*
On soil amongst grass. Powerscourt. Sept.
Sporidia (·0006 in.) ·015 m.m. diameter.

**Peziza (Humaria) schizospora.** *Phillips.* "Phillips' Humaria."
Gregarious, sessile, urceolate then plane, red, becoming brown, externally pruinose; sporidia spherical, smooth, with a large nucleus, paraphyses filled with orange granules, clavate at the tips.—*Phillips in litt.*
On burnt or sandy ground. Shrewsbury. (W. Phillips.)
Sporidia (·0004 in.) ·01 m.m. diameter, containing a single large nucleus, which escapes by rupture of the epispore.
Allied to *P. Wrightii.*—B. & Br.·

**Peziza (Humaria) subhirsuta** *var.* **macrocystis.**
Gregarious or scattered, cup shaped then flattened; margin entire, slightly elevated, externally brownish, smooth, or minutely granular; disc orange-red; asci cylindrical; sporidia elliptical, narrow; paraphyses clavate, filled with orange granules.
On burnt soil. Shrewsbury. (W. Phillips.)
The external cells of the cup are very large: cups 1-2 lines broad, sporidia ·0009 × ·0005 in.

**Peziza (Dasyscypha) citricolor.** *B. & Br.* "Lemon-coloured Peziza."
Cups very shortly stipitate or sessile, between fleshy and waxy, turbinate, finely tomentose, lemon-coloured; sporidia fusiform, with

oleaginous granules; paraphyses linear.—*B. & Br. Ann. N. H., No.* 1321, *t.* xix. *f.* 14.

On rotten wood. March.

Cups. ·0009 in., sporidia (·0008-·001 × ·0002-·00025 in.) ·02-·025 × ·005-.006 m.m. Asci (·0035-·004 in.) ·085-·1 m.m. long.

**Peziza (Dasyscypha) stereicola.** *Cooke.* "Rose-pink Peziza."

Gregarious, minute; cups globose, then cup-shaped, between fleshy and waxy, externally woolly, of a delicate rosy-pink when dry; disc of the same colour; asci subclavate; sporidia minute, cylindrical, obtuse.

On the hymenium of *Stereum.* Scotland. *(Herb. Edin.)*

Sporidia (·00025 - ·00005 in.) ·007 × ·0015 m.m.

**Peziza (Dasyscypha) candidata.** *Cooke.* "White Bramble Peziza."

Snowy white, sessile, soft, scattered or subgregarious, soon flattened; margin often lobed and irregular, slightly elevated, externally clothed with soft tomentose hairs; asci subclavate; sporidia minute, cylindrical, obtuse, hyaline.

On stems of *Rubus.* Highgate.

Sporidia (·00025 × ·00005 in.) ·007 × ·0015 m.m.

**Peziza (Dasyscypha) escharodes.** *B. & Br.* "Grey Bramble Peziza."

Cups sessile, rugose, rough with short whitish flocci, dingy olivaceous-green; margin pallid, fringed with delicate flocci; hymenium cinereous; sporidia fusiform, sometimes binucleate.—*B. & Br. Ann. N. H., No.* 1322, *t.* xix, *f.* 15. *Cooke exs. No.* 564.

On *Rubus fruticosus.* Feb.

Sporidia (·0004 in.) ·01 m.m. long. Cup at first closed, globose, ·03 in. diameter, quite black when the hairs have vanished.

**Peziza (Hymenoscypha) amenti.** *Batsch.* "Catkin Peziza."

Delicate, whitish; cups scattered, slightly convex, with the margin inflexed, watery, pellucid, at length brownish; stem short, thickened upwards; sporidia obovate.—*Batsch. El. f.* 148. *Fr. Sys. Myc.* ii. 127. *B. & Br. Ann. N. H., No.* 1323, *t.* xix. *f.* 16. *Fckl. exs. No.* 1159.

On female catkins of Abele. March.

Sporidia (·0004 × ·0002 in.) ·01 × ·005 m.m.

**Peziza (Mollisia) elaphines.** *B. & Br.* "Granular Peziza."

Cups subglobose, pale fawn-colour; mouth paler, white, sprinkled with saccharine granules; hymenium watery-grey; sporidia fusiform, hyaline, smooth, uniseriate.—*B. & Br. Ann. N. H., No.* 1325, *t.* xix. *f.* 18.

On dead wood. Jan.

Granules often disposed in lines so that the cups are radiated. Asci ·0015 in. long; sporidia fusiform (·00035-·0004 in.) 0085-.01 m.m. long.

**Peziza (Mollisia) aquosa.** *B & Br.* "Watery Peziza."

Cups at first closed, then expanded, plane, or slightly concave, greenish-brown, smooth; disc watery-grey; sporidia biseriate, ovate, apiculate.—*Berk. & Br. Ann. Nat. Hist., No.* 1326, t. xx. *f.* 19.

On or with *Sphæria hirsuta* on willow. Jan.

Resembling *P. cinerea*, but smoother and more concave when young, with totally different fruit. Cup ·024 in. diameter, growing on *Sphæria hirsuta* and its mycelium, accompanied by a brown mould, consisting of erect, simple, articulated threads, surmounted by a single oblong, uniseptate spore ·0005 in. long; asci (·002 in.) ·05 m.m. long; sporidia (·0002-·00025 × ·0001-·00015 in) ·005-·006 × ·0025-·0035 m.m., bright orange when treated with iodine.

**Peziza (Mollisia) hydnicola.** *B. & Br.* "Green Parasitic Peziza."

Cups orbicular, then irregular, plane, dark green; asci cylindrical; sporidia subglobose, uniseriate; paraphyses branched. *Berk. & Br., Ann. Nat. Hist., No.* 1327, *t.* xx. *f.* 20.

On *Hydnum ochraceum.*

Sporidia (·0004 × ·0003 in.) ·01 × ·0075 m.m. Conidia (·0001 — ·00015 in.), ·0025 × ·0035 m.m. long.

**Peziza (Mollisia) flaveola.** *Cooke.* "Yellow Fern Peziza."

Sessile, minute, bright yellow, submembranaceous; soft, soon becoming discoid, smooth, even. Asci cylindrical.

On fronds of *Pteris aquilina.* Sept. King's Lynn. (C. B. Plowright.)

A very pretty little species, but apparently very scarce, and the specimen found was not sufficiently matured for a perfect description.

**Peziza (Mollisia) Typhæ.** *Cooke.* "Bulrush Peziza."

Gregarious or scattered, minute, erumpent, sessile, black, soft or waxy, soon plane, laterally compressed when dry; disc fuliginous, black when dry, minutely papillate, even; asci cylindrical, sporidia fusiform, hyaline simple. *Cooke, Exs., No.* 570.

On leaves of *Typha.* King's Lynn. (C. B. Plowright.) Oct.

Sporidia (·0004-·0005 × ·0001 in.), ·012-·014 × ·0025-·003 m.m., twice as long as in *Peziza atrata*, to which this plant has great external resemblance.

**Peziza (Mollisia) Plantaginis.** *Fckl.* "Plantain Leaf Peziza."

Cups seated on a pallid spot, sessile, gregarious, minute, punctiform, at first closed, globose, at length open, externally clad with a blackish meal; margine involute, disc concave, pallid-brown; asci elliptic-oblong, sporidia biseriate, elongated-lanceolate, straight. *Fckl. Sym. Myc.*, 294. *Peziza atrata* forma *foliicola, Desm. Exs.*

On leaves of *Plantago lanceolata.* King's Lynn. (C. B. Plowright.)

Sporidia (·0005 × ·00015 in.), ·016 × ·004 m.m.

**Peziza (Mollisia) incarnata.** *Cooke.* "Rosy fir-leaf Peziza."

Scattered, minute, roseate, sessile, cups soon expanded, nearly plane, externally paler; asci cylindrical, sporidia linear, obtuse, hyaline.

On pine leaves. Scotland. (A. Jerdon.)

Sporidia (·0004 × 00005 in.), ·01 × 0015 m.m.

**Peziza (Patellea) artemisiæ.** *Lasch.* "Mugwort Peziza."

Erumpent, thin, almost stipitate; cups at first top-shaped, then

flattened, somewhat rounded, naked, brownish-black; disc whitish; margin incurved. Asci cylindrical; sporidia linear, minute, hyaline. —*Lasch. in Rabh. Herb. Myc. No.* 335.

On stems of *Artemisia vulgaris.* Isle of Wight.

**Peziza (Patellea) amphibola.** *Nyl.* "Lichenoid Peziza."

Cups black, somewhat rugulose, becoming plane, delicately marginate, or at length rather convex and immarginate; asci clavato-cylindrical; sporidia fusiform, 3-5 septate; paraphyses slender, simple or branched, slightly incrassated at the tips.—*Nyl. Obs. p.* 66. *Hepp. Flecht. Eur. No.* 711. *Karsten Mon. Pez.* 168.

On bark of *Pinus sylvestris.* (Dr. Holl and W. Phillips.)

Sporidia (·0005-·0007 × ·0001-·00015 in.) ·014-·02 × 003-·004 m.m.

**Ascobolus (Ryparobius) Cookei.** *Boud.* "Cooke's Ascobolus."

Much crowded, rarely scattered, very minute, externally brown, hemispherical; disc pallid, tawny, marginate; asci broad, short, somewhat attenuated at the base; sporidia 64, oblong-ovate, minute, hyaline; paraphyses few, septate, slightly incrassated.—*Boud. Mon. Asc. p.* 48, *t.* 9, *f.* 24. *Ascobolus Cookei, Crouan Flor. Finist. p.* 56. *Ascobolus myriadeus, Karst. Syn. Pez. & Asc. fide Nyl.*

On dung (cow, rabbit, &c.). Herefordshire. (J. Renny.) Near London. (M. C. C.) Near Bath. (C. E. B.)

**Ascobolus (Ascophanus) aurora.** *Crouan.* "Glowing Ascobolus."

Scattered, minute, orange-red, shining, flattened; disc plane, or convex when old, distinctly papillate; asci clavate, octosporous; sporidia ovate, small, even; paraphyses orange, slender, simple, bifid, or trifid, curved.—*Crouan Ann. des Sci. Nat. ser.* 5, x. *t.* 11, *f.* 36. *Berk. & Br. Ann. Nat. Hist., No.* 1329. *Boud. Mon. Asc. p.* 58, *t.* 11, *f.* 36.

On cow dung. Feb.

Sporidia (·00015-·0003 in.) ·0035-·007 m.m.

**Stictis graminum.** *Desm.* "Grass Stictis."

Orbicular, scattered, small, deeply excavated; disc black; margin prominent, clad with a white meal, nearly entire; asci elongated; sporidia [very minute, globose].—*Desm. Pl. Crypt. Exs. No.* 1071. *Ann. des. Sci. Nat.* (1840) xiii. 185. *Berk. & Br. Ann. Nat. Hist., No.* 1328. *Fckl. Exs. No.* 1106. *Fckl. Sym. Myc. p.* 250.

On *Carex paniculata.* June.

Desmazieres describes the sporidia as "very minute, globose." Fuckel as "filiform, as long as the ascus." Not having seen the British plant, we cannot determine the form of the sporidia.

**Patellaria constipata.** *Blox.* Handbook No. 2176.

This appears from comparison of authentic specimens of both to be only *Patellaria livida*, B. & Br., with the sporidia more fully matured.

## BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from p. 132.)*

**Peziza (Mollisia) pteridis.** *A. & S.* "Bracken Peziza."

Sessile, small, between waxy and soft, cup-shaped, internally dingy yellowish, externally subgranulose, olivaceous, margin crenate. Asci oblong, sessile; sporidia oblong-clavate, hyaline.—*Alb. & Schw. Consp. t.* xii. *f.* 7. *Fckl. exs. No.* 2191. *Trichopeziza pulveracea, Fckl. Sym. Myc. p.* 297.

On stems of *Pteris aquilina.* Darenth (M. C. C.) King's Lynn. (*C. B. Plowright.*)

Sporidia (·0003-·0004 in.) ·008-·01 m.m. long. Nearly black when dry. The figure in Alb. & Schw. is much paler externally than the specimens published by Fuckel with which ours agree.

**Nectria Leightoni.** *Berk.* "Leighton's Nectria."

Scattered, minute; perithecia ovate, yellow, or lurid-red; sporidia subcymbiform, triseptate, hyaline.—*Berk. in Fungi Cubensis. Linn. Journ.* (1868), *p.* 379.

On Larch, &c. Yorkshire. *(Rev. W. Leighton.)*

Also found in Cuba. Sporidia (·001 in.) ·025 m.m. long.

**Nectria furfurella.** *B. & Br.* "Mealy Nectria."

Springing from a flesh-coloured effused stratum; perithecia flesh-coloured, subglobose, then collapsed, sprinkled with furfuraceous, shining particles; ostiolum distinctly punctiform. Sporidia ovate. Paraphyses branched. Conidia ovate.—*Berk. & Br. Annals Nat. Hist., No.* 1331, *t.* xx., *f.* 22.

On cabbage stalks. Feb., 1869.

Sporidia (·00015-·0002 in.) ·0035-·005 m.m. long. Conidia (·0002-·0003 in.) ·005-·0075 m.m. long.

**Diatrype (Diatrypella) verrucæformis.** *Ehr.* var. **Tocciæana.** *De Not.*

Pustulæform, subhemispherical, depressed at the apex, fuscescent, soon naked. Perithecia 3-6, seldom more, sphæroid, with a short neck. Asci clavate, very much elongated at the base, polysporous. Sporidia minute, spermatoid.—*De Not., Sfer. Ital., p.* 30, *t.* 31. *Fckl. Sym. Myc., p.* 233. *Fckl. exs., No.* 2059. *Rabh. Fung. Eur. No.* 253. *Cooke exs. No.* 483.

On *Alnus glutinosa.* King's Lynn. (*C. B. Plowright.*)

**Valsa cypri.** *Tul.* "Privet Valsa."

Perithecia 3-8 minute, circinating, buried in the inner bark, globose, collapsing, ending in very short attenuated necks, which are collected in a truncated disc; ostiola small, scarcely emergent, black. Asci subclavate; sporidia cylindrical, curved, simple, hyaline. Spermagonia unilocular, globose; spermatia cylindrical, curved, issuing in olivaceous tendrils.—*Tul. Carp.* ii. 194, *t.* 25, *f.* 10-20. *Fckl. Sym. Myc., p.* 198. *Fckl. exs.*, 1969. *Nitschke Pyren. Germ., p.* 206.

On twigs of *Ligustrum vulgare.* Twycross.

Sporidia (·0004 × ·000075 in.) ·011 × ·002 m.m. Spermatia (·0002-00025 × ·00005 in.) ·005-·006 × ·0015 m.m.

**Sphæria (Villosæ) felina.** *Fckl.* "Fuckel's Hairy Sphæria."

Perithecia scattered, globose, everywhere covered with erect hairs, black; ostiola truncate, conical, short. Asci broad. Sporidia clavato-falciform; conidia brown, pentagonal or doliiform, concatenate, springing from flexuous horizontal threads.—*Fckl. Fungi. Rhen., No.* 945. *Berk. & Br. Ann. Nat. Hist., No.* 1332, *t.* xx. *f.* 23. *Leptospora Felina. Fckl. Sym. Myc., p.* 144.

On *Rubus.* Mar.

Sporidia (·0025 in.) ·065 m.m. long; conidia (·001-·002 in.) ·025-·050 m.m. long.

**Sphæria (Villosæ) cupulifera.** *B. & Br.* "Cup-bearing Sphæria."

Perithecia conical, obtuse, at length collapsed, delicately rugulose, shining, with here and there erect, articulate, rigid, even flocci, the ultimate articulations wedge or cup-shaped, resolved into truncate cuneate conidia. Sporidia fusiform, at length 4-septate.—*Berk. & Br. Ann. Nat. Hist., No.* 1333, *t.* xxi., *f.* 24.

On rotten elm roots. April.

The cladotrichoid hairs sometimes spring immediately from the mycelium. The conidia are sometimes pentangular; sporidia (·0008-·001 in.) ·02-·025 m.m. long; conidia (·0005 in.) ·0125 m.m. long, (·0003 in) ·0075 m.m. wide at the top.

**Sphæria (Denudatæ) pomiformis.** *P.* Handbook, No. 2580.

Conidia.—Flocci erect, simple, articulated, white, the two superior articulations minutely echinulate, acrospores elliptical, brown, borne on distinct, narrowly elliptical sporophores, forming a subglobose head.—*Sporocybe albipes, B. & Br., MSS., Ann. Nat. Hist. No.* 1333* *t.* xxi., *f.* 28.

Acrospores (·0003-·0006×·0002-·00025 in.) ·0075-·015×·005-·006 m.m.; threads (·004-·009 in.) ·1-·225 m.m. high.

**Sphæria (Erumpentes) lichenicola.** *De Not.* "Solorina Sphæria."

Perithecia innate, erumpent, scattered or crowded, rounded, verrucose, black, pierced with a punctiform ostiolum which is scarcely conspicuous, and impressed. Asci clavate; sporidia cylindrical, obtuse, sometimes curved, at first binucleate, at length quadrilocular and slightly coloured. (Not *Sph. lichenicola*, Somm.)

*Bertia lichenicola, De Not., in Rabh. Fung. Eur. No.* 950.

On Thallus of *Solorina crocea.* Scotland. (*Dr. Stirton.*)

Sporidia (·0015-·002 in.) ·04-·05 m.m. long. *Bertia Solorinæ*, Anzi (Hedwigia, viii., p. 14), is closely allied, but seems to be distinct.

**Sphæria (Ceratostoma) crinigera.** *Cooke.* "Woolly-beaked Sphæria."

Subgregarious or scattered, black. Perithecia subglobose, semiimmersed, pubescent. Ostiola spinulose. Asci cylindrical, narrow. Sporidia uniseriata, elliptical, triseptate, hyaline.

On pine wood. King's Lynn. (*C. B. Plowright.*)

Allied to *Sphæria cirrhosa*, Fr. Sporidia (·0004-·0005 in.) ·01-·0125 m.m. long.

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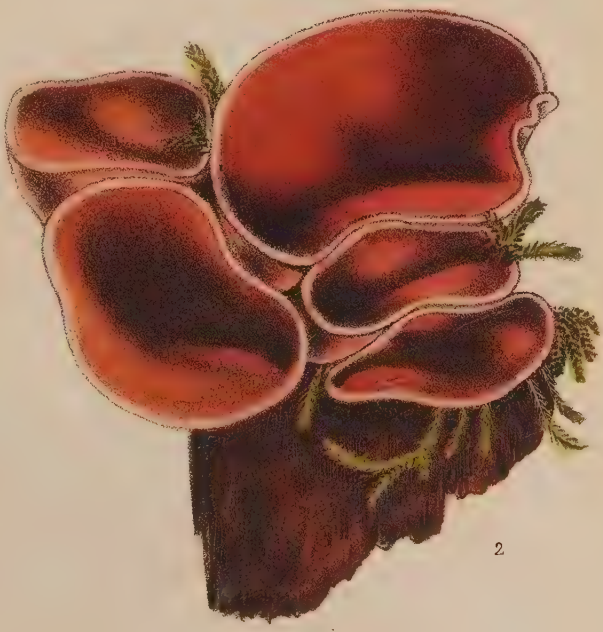
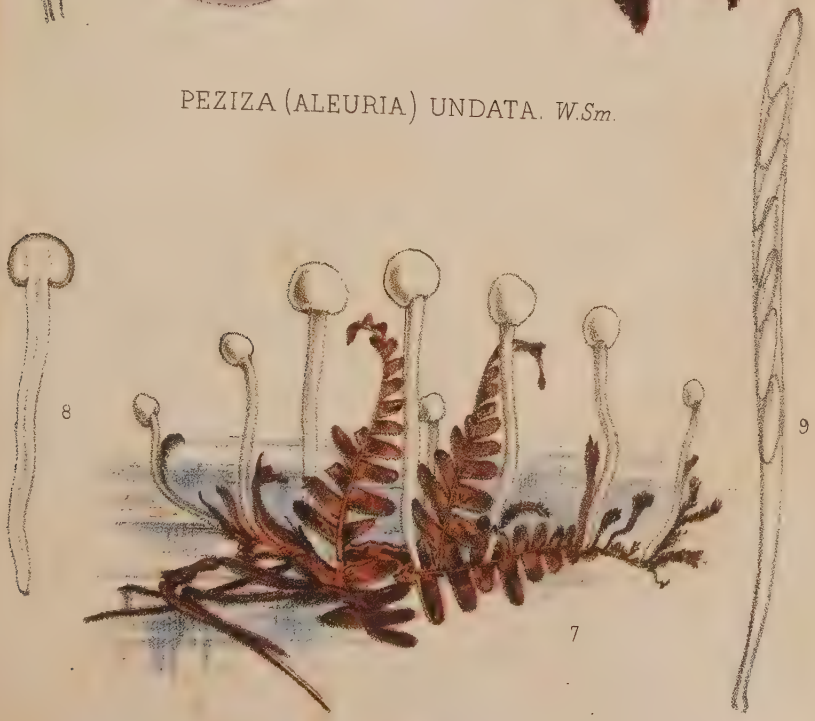


2

PEZIZA (ALEURIA) UNDATA. *W.Sm.*




MITRULA ALBA. *Wes.*

## NEW ASCOMYCETOUS FUNGI.

*By* Worthington G. Smith, F.L.S.

**Mitrula alba.** *W. G. Sm.*

Head globose, even, white; stem stuffed, white; asci linear, sporidia lanceolate, hyaline, enucleate.

Amongst submerged leaves. East Budleigh, Budleigh Salterton (Cecil H. Sp. Perceval, Esq.) April, 1871.

Sporidia ·00065 × ·0012 in. Differs entirely from *M. paludosa*, Fr., in colour, and especially in the globose head and stuffed stem.

[Plate 10, fig. 7., *Mitrula alba*, nat. size. Fig. 8 section. Fig. 9 asci and sporidia ×700 dia.]

**Peziza (Aleuria) isabellina.** *W. G. Sm.*

Cups large, sessile, fleshy, subglobose, internally smooth, brownish yellow with a shade of red, externally paler, subpruinose; sporidia elliptic.

On decayed coniferous wood. King's Lynn, Norfolk. (Chas. B. Plowright, Esq.) April, 1871.

Cups 1-2 in. across; sporidia ·00056 × ·00034 in. Allied to *P. macrocalyx* and *P. vesiculosa*, but entirely differs from both in colour, habit, and fruit.

[Plate 9, fig. 1, 2. *Peziza isabellina* nat. size. Fig. 3 section Fig. 4 asci and sporidia × 700 dia.]

**Peziza (Aleuria) undata.** *W. G. Sm.*

Middle sized, fleshy, slightly concave, at length reflexed, generally corrugated, rooting, variable in colour, purple, buff, grey, yellowish, or pallid; sporidia elliptic.

On tree fern stems. Messrs. Veitch's nursery, Chelsea. May, 1870.

Cups $\frac{1}{2}$-$\frac{3}{4}$ in. across; sporidia ·00023 × ·00018 in. Allied to *P. purpurascens*, but differing in the sporidia, which, in the latter, are three times as long as broad; also allied to *P. viridaria*, *P. applanata*, *P. violacea*, and *P. fuliginea*, but differing from all.

[Plate 10, figs. 1, 2. *Peziza undata*, nat. size. Fig. 3 side view, Figs. 4, 5 sections. Fig. 6 sporidia × 700 dia.]

## BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from p. 156.)*

**Sphæria (Immersæ) parallela.** *Fr.* "Parallel Sphæria."

Immersed, black; perithecia globose, disposed in lines; ostiola rather prominent, crowded, globose, even. Asci subcylindrical; sporidia linear, obtuse, straight or curved, uniseptate, pale brown. —*Fries. Ex., No.* 3. *Fries Sys. Myc.*, ii. 373. *Sphæria linearis. Grev. in Herb. Ed.*

On decorticated pine wood. Scotland. (Dr. Greville.)

The specimen, on the authority of which this species is recorded as British, is in the Edinburgh Herbarium. It accords exactly with Fries's Scler. Suec. No. 3. Sporidia (·0004 in.) ·01 m.m. long.

**Sphæria (Obtectæ) rhodobapha.** *B. & Br.* "Red Staining Sphæria.
Perithecia semi-immersed, compressed, ostiola papillæform; the matrix tinged with rose-colour. Asci clavate, sporidia fusiform, multinucleate.—*Berk. & Br. Ann. Nat. Hist., No.* 1334, *t.* xxi., *f.* 29.

On dead decorticated branches. Apr.

Perithecia fragile, for the most part compressed and elongated, so as to approximate Pertusæ and Macrostomæ. The subjacent wood is tinged throughout with magenta pink. Sporidia with several nuclei (·001 in.) ·025 m.m. long.

**Sphæria (Obtectæ) mammillana.** *Fr.* "Teat-like Sphæria."
Scattered. Perithecia hemispherical, rather prominent, covered by the blackened adnate cuticle; ostiola papillæform. Asci cylindrical; sporidia uniseriate, or biseriate, cylindrical, obtuse, brown. —*Fries Sys. Myc.* ii., 487.

On oak twigs. Castle Rising. (C. B. Plowright.)

Allied to *Sphæria clypeata*, N., with which it is associated by some authors. Sporidia very variable in length, sometimes pseudo-septate (·0008-·001 in.) ·02-·025 m.m. long.

**Ceratostoma Helvellæ.** *Cooke.* "Peziza Ceratostoma."
Perithecia soft, membranaceous, ovate, smooth, pale brown, at first semi-immersed; neck scarcely equal in length to the diameter of the perithecia, ending in a somewhat erect fringe of hairs. Asci clavate, fasciculate, soon disappearing. Sporidia lemon-shaped, simple, dark-brown; epispore smooth.

On the hymenium of *Peziza hemispherica*. Eastbourne. (C.J.Muller.)

Sporidia ·0009-·0001 in. long, about two-thirds as broad. This belongs to Corda's genus *Melanospora*, which seems scarcely capable of separation from *Ceratostoma* of Fries.

**Venturia atramentaria.** *Cooke.* "Inky spot Venturia."
Hypophyllous, gregarious, forming irregular patches upon discoloured spots. Perithecia subglobose, clad with short, dense, patent hairs, black. Asci cylindrical; sporidia uniseriate, elliptic (probably septate when mature).—*Scottish Naturalist, March*, 1872. *Cooke, exs., No.* 599.

On living leaves of *Vaccinium uliginosum*. Lochnagar. (Dr.B.White.)

Differs from *Venturia myrtilli* in the larger perithecia, gregarious habit, and shorter and denser hairs, as well as in other particulars.

**Capnodium salicinum.** "Willow Capnodium."
Forming a thin velvety black stratum; mycelium moniliform, the articulations containing a single nucleus. Peridia rather short, often obtuse, but sometimes lageniform and acuminate; sparingly forked, sometimes fringed. Asci broad, obtuse; sporidia oblong, slightly curved or oblique, oblong, triseptate, with one or two longitudinal septa, constricted at the articulations.—*Mont. Ann. Nat. Hist.*, 2nd ser. vol. iii., p. 520.—*Berk. Hort. Jour.* iv., *p.* 251. *Cooke exs., No.* 596.

On leaves of willows. Near Eastbourne. (C. J. Muller.)

**Chætomium griseum.** *Cooke.* "Grey Bristle Mould."
Subgregarious or scattered, grey or cinereous; perithecium globose, brown, submembranaceous; hairs long, elastic, circinate, pel-

lucid, faintly and very rarely septate. Asci clavate, fasciculate; sporidia lemon-shaped, colourless; endochrome granular, or nucleate.

On old sacking. King's Lynn. (C. B. Plowright.) On old rag and paper. Highgate (M. C. C.)

The threads somewhat resemble those of *Chætomium murorum*, but are stouter, less rigid, and more transparent, the sporidia are larger and colourless (·0004-·0006 × ·00025-·00035 in.) ·013-·017 × ·006-·009 m.m.

**Chætomium funicolum.** *Cooke.* "Twine Bristle Mould."

Perithecia scattered, sub ovate, black; hairs of the vertex very long, dichotomous or simple, erect, slender, acute, black; sporidia lemon-shaped, dingy-brown.—*Cooke, Microscopic Fungi, 3rd Ed. App. p.* 227.

On twine. British Museum. (W. Carruthers.)

This species is most closely allied to *C. elatum*, but much smaller and neater. It is wholly black, and without the fibrous base of *C. elatum*. The hairs are more delicate, and not half the diameter, and the sporidia are scarcely more than half as long or broad.

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## TWO BRITISH MOULDS.

*By* M. C. Cooke, M.A.

**Verticillium agaricinum.** *(Bon.)* "Agaric Verticillium."

White. Forming woolly tufts. Fertile flocci, septate, branched. Ultimate ramuli verticillate, three or four in a whorl, thickened below, attenuated upwards. Spores narrowly elliptical, obtuse, triseptate, hyaline. *Trichothecium agaricinum, Bonorden Handbk., p.* 99, *t.* v. *f.* 114.

On decayed Agarics. Ken Wood, Highgate. Autumn.

This mould agrees very closely with Bonorden's figure, and, unless the genus *Verticillium* is to be restricted to such species as have simple spores, it offers no features which would warrant its removal to another genus. The snow-white threads form a dense cottony stratum, covering the decayed Agaric.

**Œdocephalum roseum.** *Cooke.* "Roseate Œdocephalum."

Rose-pink. Effused, or in minute punctiform tufts, collected together in irregular patches. Threads equal, head subglobose, spores ovate or oval, smooth, attached by a slight apiculus. *Cooke, exs. No.* 550.

On old paper and rags. Millfield Lane, Highgate. Autumn.

This is closely allied to *Œdocephalum lœticolor*, B. & Br., but differs in colour, as well as in the form of the spores; features which seem to be sufficient to characterize it as a distinct species. The tufts are very minute, scarcely visible to the naked eye, except as forming an effused rosy patch sometimes an inch or more in diameter, on the discoloured matrix.

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should have been ·0007 in.

## TWO SPECIES OF FUNGI RECENTLY OBSERVED IN NORFOLK.

**Puccinia Asteris.** Fckl.—Sori seated upon yellow, then discoloured spots, hemisphærical, brown; spores brown, ovato-oblong, apiculate; peduncles very long.—*Fuckel. Sym. Myc. p.* 53.

On both sides of the leaves and on the stems of *Aster tripolium.* Near King's Lynn. July, 1873. In tolerable plenty.

This is a very well marked Puccinia; the hemisphærical sori are in their early stage surrounded by a yellow zone, and remain covered by the unruptured epidermis for some little time, which gives them a peculiar ashy grey colour. Dr. P. Magnus informs me this is the *P. Tripolii* of Wallroth, but the above name has been adopted on account of its more comprehensive character. Fuckel's plant was on the root leaves of *A. amellus.* I have a closely allied, if not identical species, on the leaves of some Aster, from Maine, U.S., from the Rev. E. C. Bolles.

**Macrospora scirpi.** Fckl.—Perithecia scattered, covered by the epidermis; ostiolum obtuse, slightly prominent; asci large, stipitate, subclavate, at first inflexed at the apex, then obtuse; sporidia oblong, obtuse, 5-septate, each loculus, except the two terminal, longitudinally divided, slightly constricted, pale yellow.—*Fckl. Symb. Myc. p.* 140, *t.* iii. *f.* 12.

On Typha. King's Lynn. May, 1873.

Regarded by Fuckel as the *Sphæria Scirpi* of Fries. A very different plant from *Sp. scirpicola*, D.C., in company with which it was growing.*

CHARLES B. PLOWRIGHT.

* I do not think that the above *Puccinia* can be separated from *Puccinia asterum*, Schweinitz. *Macrospora* is an unnecessary increase of genera, and belongs to *Pleospora*, if that be entitled to rank as a genus.—[ED. GREV.]

## CRYPTOGAMIC LITERATURE.

HOFFMANN, H.—On *Geaster coliformis*, P. in the "Botanische Zeitung" for June, 1873.

GRONLUND, C.—Contributions to the Flora of Iceland (*Hepaticæ and Musci*), in "Botanisk Tidsskrift."

HANSEN, C.—On the *Diatoms* found in Slesvig, in "Botanisk Tidsskrift." Pts. 1 and 2. 1873.

SMITH, W.G.—On "Abnormal Mushrooms," with numerous figures, in the "Gardeners' Chronicle" for 26th July, 1873, pp. 1016-1017.

O'MEARA, REV. E.—On Recent Researches in the *Diatomaceæ*, in the "Journal of Botany," Aug., 1873.

CHURCH, A. H.—On the composition of *Lycoperdon giganteum*, Batsch., in the "Journal of Botany," Aug., 1873.

STIRTON, DR. J.—Additions to the Lichen Flora of New Zealand, in the "Transactions of the Glasgow Society of Field Naturalists," 1873.

## TWO NEW BRITISH AGARICS.

*Described by* Professor Elias Fries.

**Agaricus Worthingtoni.** *Fr.*—Pileus slightly fleshy, campanulate, then convex, viscid (?), even, golden yellow; stem fistulose, slender, sub-flexuose, turquoise blue; gills adnate, ferruginous brown. *Fries in Journ. Bot.* (1873), *p.* 204. A. (Stropharia) albocyaneus, *Saund. & Sm. Myc. Ill.*, *t.* 29, *f.* 1-5 (not Desm.)

Pastures. Walthamstow. Dec.

Differing from *Ag. albo-cyaneus*, in which the stem is soft, hollow, 3-4 lines thick, and shorter; pileus fleshy, convex, then plane, milky-white, then becoming verdigris-green; gills whitish, then brownish. Spores ·00027 × ·00017 in.

**Agaricus Saundersii.** *Fr.*—Pileus fleshy, thin about the margin, convex, smooth, viscid (?), becoming whitish; stem solid, firm, equal, smooth, white; gills slightly adnexed, broad, distant, flesh-coloured. *Fries in Journ. Bot.* (1873), *p.* 205. A. (Entoloma) majalis, *Saund. & Sm. Myc. Illus. t.* 46 (not Fries).

Growing on the ground in patches.

*Ag. majalis*, Fr., differs from this, especially in the slender stature, fistulose stem, membranaceous pileus, which is campanulate on opening, and cinnamon, and in the gills being free, crowded, and crenate.

Ascochyta Tiliæ, Lasch.; Oïdeo Fagineæ, Lasch.; Aposporium Mali, Wallr.; Cladosporium Fumago, P., on vine leaves; Antennatula pinophila, Fr.; Capnodium Persoonii, B. & D., on hornbeam and lime leaves; Corticium amorphum, Fr. In Bohemia this is stated to be very destructive to the young fir trees; the affected trees usually perishing between the twelfth and sixteenth year. Acalyptospora nervisequia, Cast., on elm leaves; Exobasidium vaccinii, Wall., on the cranberry; Torula chrysosperma, Cd., on opium; Merulius lacrymans, Fr., Saccharomyces Cerevisiæ Meyen.; S. Mycoderma, Rees.; and several other more or less important species.

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## BRITISH GEASTERS.

In the columns of the "Gardener's Chronicle," Mr. Worthington G. Smith has from time to time contributed a synopsis of the British species of *Geaster*, with illustrations, which, by the kind permission of the editor and proprietors of that journal, we have been permitted to reproduce for the benefit of our readers.

1. **Geaster coliformis.** *P.*—Cooke's "Handbook," No. 1070. "Gardener's Chronicle," 1873, p. 469, fig. 86. [Pl. xv., fig. 1.]

Spores ·0002 in. diam.

Fig. 1.

Fig. 2.

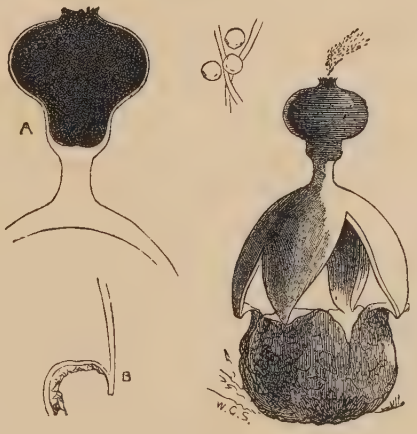


Fig. 1. GEASTER COLIFORMIS. P.
*After Sowerby, half actual size: spores × 700 diam,*

Fig. 2. GEASTER FORNICATUS FR.

Fig. 1.

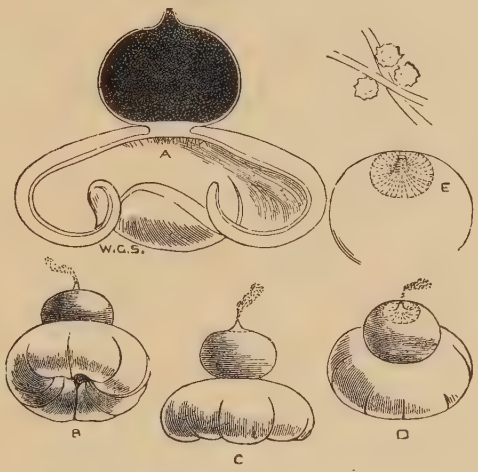


Fig. 2.

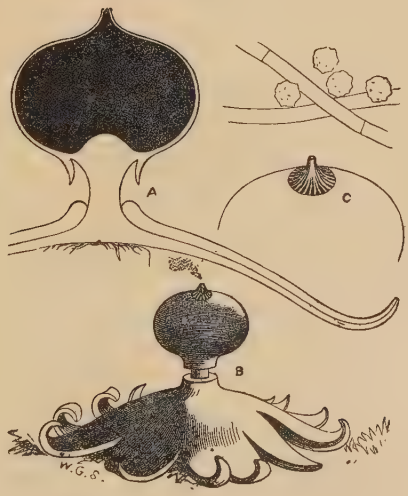


Fig. I. GEASTER STRIATUS. D.C.
B. C. D. *half actual size. Section* (A) *and mouth* (E) *real size. Spores* × 700 *diam.*

Fig. 2. GEASTER BRYANTII. B.
*Half actual size. Section of Peridium* (A) *and mouth* (C) *real size. Spores* × 700 *diam.*

Fig. 1.

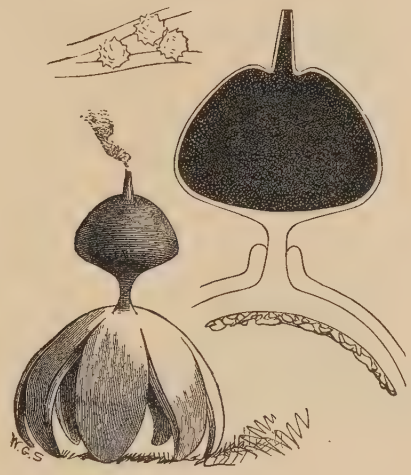

Fig. 2.

FIG. 1. GEASTER LIMBATUS, Fr.
*Half actual size. Section of inner peridium real size. Spores* × 700 *diam.*

FIG. 2. GEASTER FIMBRIATUS, Fr.
*Half actual size. Section real size. Spores* × 700 *diam.*

Fig. 1.

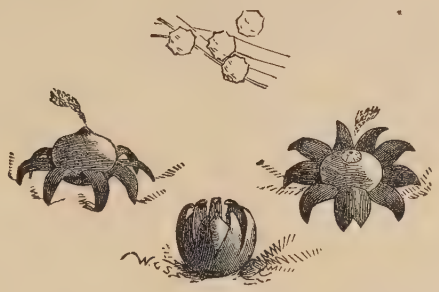

Fig. 2.

1. GEASTER MAMMOSUS. Chev.
*After Sowerby: spores* × 700 *diam.*

2. GEASTER RUFESCENS. Fr.
*Half actual size: section real size: spores* × 700 *diam.*

GEASTER SACCATUS, Fr.

*(Reprinted, by permission, from the "Gardener's Chronicle.")*

2. **Geaster fornicatus.** *Fr.*—Cooke's" Handbook," No. 1071. " Gardener's Chronicle, 1873, p. 469, fig. 87. [Pl. xv., fig. 2.] Spores ·00015 in. diam.

3. **Geaster striatus.** *D.C.*—Cooke's " Handbook," No. 1072. " Gardener's Chronicle," 1873, p. 469, fig. 88. [Pl. xvi., fig. 1.] Spores ·00016 in. diam.

4. **Geaster Bryantii.** *B.*—Cooke's " Handbook," No. 1073. " Gardener's Chronicle," 1873, p. 504, fig. 94. [Pl. xvi., fig. 2.] Spores ·00018 in. diam.

5. **Geaster limbatus.** *Fr.*—Cooke's " Handbook," No. 1074. " Gardener's Chronicle," 1873, p. 504, fig. 95. [Pl. xvii., fig. 1.] Spores ·00019 in. diameter.

6. **Geaster fimbriatus.** *Fr.*—Cooke's " Handbook," No. 1075. " Gardener's Chronicle," 1873, p. 543, fig. 104. [Pl. xvii., fig. 2.] Spores ·0001 in. diam.

7. **Geaster mammosus.** *Chev.*—Cooke's " Handbook," No. 1076 " Gardener's Chronicle," 1873, p. 543, fig. 105. [Pl. xvii., fig. 1.] Spores ·00035 in. diam.

8. **Geaster rufescens.** *Fr.*—Cooke's " Handbook," No. 1077. " Gardener's Chronicle," 1873, p. 577, fig. 111. [Pl. xvii., fig. 2.] Spores ·00017 in. diam.

9. **Geaster hygrometricus.** *P.* - Cooke's "Handbook," No. 1078. " Gardener's Chronicle," 1873, p. 577, fig. 112. [Pl. xiv., fig. 2.] Spores ·00035 in. diam.

10. **Geaster Michelianus.** *W. G. S.*—" Grevillea," vol. ii., p. 35. Pl. xiii., " Gardener's Chronicle," 1873, p. 608, fig. 115. Spores ·00014 in. diam.

11. **Geaster lagenæformis.** *Vitt.*—" Grevillea," vol. ii., p. 35. Pl. xiv., fig. 1. " Gardener's Chronicle," 1873, p. 608, fig. 116. Cooke's " Handbook," No. 1079.
Spores smooth, ·00012 in. diam.

12. **Geaster saccatus.** *Fr.*—" Gardener's Chronicle," 1873, p. 1275, fig. 266. [Pl. xviii.]
Outer peridium saccate, cleft into many flaccid subinvolute laciniæ; interior peridium sessile, crowned with a circular flat disc, and a sharp silky mouth. Spores dark brown, slightly echinulate.
By hedge banks. Truro.
Spores ·00013 in. diam.

The spores in all the foregoing figures are magnified 700 diameters.

## THE MOSSES OF IRELAND.

Bryologists will be very glad to make the acquaintance of such a complete and careful synopsis as Dr. David Moore has recently produced of the mosses of Ireland. This synopsis was first published in the proceedings of the Royal Irish Academy (vol. i., ser. 2, Science), and since issued in a separate form, but as no publisher's name appears on the title-page, and no price is stated, we are not in a position to affirm whether it has been published in the separate form, or only printed for private circulation. The arrangement adopted is lucid and distinct, generic characters are given, with tabular diagnoses of species; these are followed by ample references to full descriptions and figures, with an enumeration of the Irish localities, ending with a copious index. Altogether here are 140 compact 8vo. pages, representing such a mass of work that we should be afraid to compute the time it must have occupied

## BRITISH FUNGI.

*By the* EDITOR.

*(Continued from Page* 176.*)*

The number of species of Fungi found in this country since the conclusion of our series of descriptions in the last volume of this Journal has rendered it incumbent upon us, in fulfilment of promise, to continue the descriptions of these additions as a supplement to the "Handbook of British Fungi."

**Agaricus (Lepiota) granulosus.** *Batsch.* *var.* **Carcharias.** *Fr.*

Pileus umbonate, clad with darker evanescent granules; stem subbulbous, and as well as the patent ring squamulose with granules; gills adnexed, white.—*Fries, Ep., p.* 18. *Pers Ic. Pict., t.* 5, *f.* 1. *Smith, Journ. Bot.*, 1873, *p.* 335 = var. *incarnato-albida. Fr. Mon. Hym. Suec., p.* 29.

On grass under old Scotch firs.

**Agaricus (Armillaria) aurantius.** *Schæff.*

Pileus fleshy, convex then plane, obtuse, innato-squamulose, viscid; stem solid, equal, concolorous, guttate above, clad with orange scales, sub-annulate; gills adnexed with a tooth, crowded, white.—*Fries Epicr., p.* 21. *Sys. Myc. i.*, 39. *Schæffer, Ic.* 27. *B. & Br. Ann. N.H.*, 1335.

In pine woods. Forres, N. B.

Varying a good deal in the nature and frequency of the scales.

**Agaricus (Clitocybe) tuba.** *Fr.*

White, pileus fleshy, thin, convex, then plane, umbilicate, moist, shining with a whitish silky lustre, margin even; stem equal, soon hollow and compressed, naked above, gills attenuated and decurrent,

broad, much crowded, white, growing pallid.—*Fries Epicr.*, *p.* 72. —*Smith, Journ. Bot.*, 1873, *p.* 336.

Amongst leaves. Epping Forest.

**Agaricus (Clitocybe) ericetorum.** *Fr.*

White, pileus fleshy, convex, then plane, or concave (sub-turbinate) smooth, shining when dry; stem stuffed, short, tough, smooth, attenuated downwards, gills decurrent, broad, connected by veins.—*Fries Epicr.*, 73. *B. & Br. Ann. N.H.*, 1338. *Bull, t.* 551, *fig.* 1.

On heathy places. Sept.

Pileus, 1-2 in. broad; stem 1 in. long, 2-3 lines thick.

**Agaricus (Clitocybe) gangrænosus.** *Fr.*

Pileus fleshy, convex, then plane, obtuse, at the first covered with white powder, then naked, variegated or virgate; stem solid, spongy, sub-bulbous, soft, striate; gills sub-decurrent, arcuate, crowded, dingy-white.—*Fries. Epicr. p.* 56. *Batt. t.* 20, *f.* M. *Smith, Jour. Bot.* (1873), 355.

In woods. Street.

At length turning jet black.

**Agaricus (Clitocybe) subinvolutus.** *Sm.*

Pileus plane, fleshy; margin subinvolute; gills broad, decurrent; stem stuffed, sub-bulbous; whole plant cream-coloured, every part at length becoming spotted.—*Smith in Jour. Bot.* (1873), *p.* 336.

In woods, &c.

Always smaller than *A. geotrupus*, Fr., with a stem one-third the length. It is, moreover, never umbonate, and the fruit is different.

**Agaricus (Collybia) succineus.** *Schæff.*

Pileus rather fleshy, convex, then expanded, at length somewhat depressed, even; stem fistulose (not rooting), pallid-rufous, quite smooth; gills obtusely adnexed, broad, rather thick, serrulate, somewhat distant, whitish.—*Schæff Icon., t.* 45. *Fries Epicr., p.* 91. *B. & Br. Ann. N. H., No.* 1339.

Amongst grass. Coed Coch.

Stem 1-2 in. long, 1-2 in. thick; pileus 1 in. broad.

**Agaricus (Collybia) aquosus.** *Bull.*

Pileus rather fleshy, convex, then expanded, umbonate, scarcely changing, margin rather inflexed; stem fistulose, thin, equal, straight, rooting, smooth, even; gills nearly free, crowded, narrow, white.—*Bull t.* 12. *Fries Epicr., p.* 92. *Sys. Myc. i.*, 125. *B. & Br. Ann. N. H., No.* 1340.

Amongst moss. Coed Coch.

**Agaricus (Collybia) tylicolor.** *Fr.*

Pileus rather fleshy, convex, then plane, somewhat umbonate, even, smooth; stem fistulose, equal, even, pulverulent; gills free, distant, plane, greyish.—*Fries Epicr.*, 98. *Sys. Myc. i.*, 132. *B. & Br. Ann. N. H., No.* 1341.

In woods. Coed Coch.

# Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

## BRITISH FUNGI.

*By the* Editor.

(*Continued from Page* 109.)

**Agaricus (Tricholoma) macrocephalus.** *Schulzer.*

Sub-gregarious, very large; stem solid, ventricose, delicately granulated, whitish, ochraceous below, produced into a fleshy root; pileus compact, fleshy, convex then plane, somewhat depressed; cuticle at first smooth, at length broken up in a tessellated manner, ochraceous, darker when old; gills deeply emarginate, nearly free, attenuated behind, scarcely crowded, pallid.—*Schulzer, Icon. Hym. Hung., t.* 3. *Smith, Jour. Bot.* (1873), *p.* 336.

In grassy places. King's Lynn.

Very large, emulating *Ag. colossus.* Odour very powerful, like *Lilium auratum;* stem long, subterranean; flesh firm, slightly yellowish; taste unpleasant; spores irregularly globose, ·006 m.m.

**Agaricus (Omphalia) Fibula.** *Bull.* (Handbook No. 227.) *Var.* **Swartzii.** *Fr.*

Rather firm; pileus at length nearly plane, whitish; disc tawny; stem whitish, slightly violet-coloured above.—*Fries, Mon. Hym. Suec., i., p.* 193. *Smith, Journ. Bot.* (1873), *p.* 336.

In woody places. Crystal Palace.

**Agaricus (Entoloma) Saundersii.** *Fr.*

(*Grevillea, ii., p.* 63.)

Growing on the ground in patches.

**Agaricus (Entoloma) Wynnei.** *B. & Br.*

Pileus at first plane, fuliginous, velvety, then convex, squamulose, hygrophanous; margin striate, often undulating; stem fuliginous, blue, compressed; base cottony; gills broad, transversely ribbed, pallid, margin crenulate; having the odour of bugs.—*Ann. Nat. Hist., No.* 1342.

In fir woods. Coed Coch. Sept.

Allied to *Ag. costatus,* with which it agrees in size.

**Agaricus (Nolanea) mammosus.** *L.*

Pileus sub-membranaceous, conical or campanulate, papillate, striate, hygrophanous, when dry isabelline, silky; stem fistulose,

rigid, polished, even, smooth, sprinkled, above with white meal; gills fixed, seceding, rather crowded, grey.—*Linn. Suec.*, *No.* 1218. *Fries, Epic.*, 156. *B. & Br. Ann. N. H.*, *No.* 1343. *Bull, t.* 526. *Batsch, fig.* 5.

On lawns. Coed Coch. Sept.

Pileus tawny; stem elongated, fragile.

**Agaricus (Nolanea) icterinus.** *Fr.*

Pileus sub-membranaceous, campanulate, then convex, papillate, striate, hygrophanous; stem somewhat stuffed, short, rigid, between flocculose and farinaceous; gills adfixed, or free, distant, ventricose, pallid.—*Fries, Sys. Myc.*, *p.* 207. *Fries, Epicr.*, *p.* 157. *Sm., in Journ. Bot.*, 1873, *p.* 384.

In woods, &c., near Hereford. Oct.

Colour yellowish, or greenish yellow.

**Agaricus (Pholiota) Arrhenii.** *Fr.*

Pileus fleshy, thin, campanulate, expanded, smooth; stem fistulose, rigid, fibrous or strigose, and cracking, pallid above, ring entire, distant; gills adnate, then seceding, ventricose, narrow behind, becoming yellowish.—*Fries, Epicr.*, *p.* 161. *Smith, Journ. Bot.*, 1873, *p.* 336.

In a wood yard among chips. N. Wootton.

A totally different plant from *A. mycenoides*. Slender. Stem 3-4 in. long, $1\frac{1}{2}$ in. thick; pileus $1\frac{1}{2}$ in. broad.

**Agaricus (Hebeloma) relicinus.** *Fr.*

Pileus fleshy, thin, conical, then expanded, obtuse, squarrose with tomentose scales; stem solid, soft, equal, floccoso-squamose; gills adnexed, crowded, yellow, then olivaceous.—*Fries, Epicr.*, 171. *Sys. Myc. i.*, 256. *B. & Br. Ann. N.H.*, 1344.

Under pines. Stannage Park.

Colour fuliginous, without any perceptible odour.

**Agaricus (Hebeloma) Clarkii.** *B. & Br.*

Pileus campanulate, white, silky; stem nearly equal, flocculose, stuffed; gills adnexed, white, marginate.—*Ann. Nat. Hist.*, *No.* 1345.

In shady places. Street. Oct., 1871.

Allied to *A. sindonius*. Pileus $\frac{2}{3}$ in. across, 1 in. high; stem $1\frac{1}{2}$ in. high, 2 lines thick; slightly incrassated at the base.

**Agaricus (Hebeloma) truncatus.** *Fr.*

Pileus compact, convex, then plane, undulated, or flexuose, smooth, rather dry; stem solid, stout, equal, entirely pruinose with white; gills emarginate or free, crowded, dry, whitish, then flesh-coloured, at length ferruginous.—*Fries, Epicr.*, *p.* 181. *Schæff., Icon., t.* 251. *B. & Br. Ann. N. H.*, 1346.

On the grassy base of a bank. Dangstein. Sept.

Pileus $1\frac{1}{2}$-2 in. across, plane, rigid, slightly viscid, rufous, depressed in the centre, smooth, margin crisped, inflexed, the extreme edge pruinose; stem $2\frac{1}{2}$ in. high, $\frac{3}{4}$ thick, claviform at the base,

stuffed, fibrilloso-striate, pale, rufous, less deeply coloured below; gills narrow, adnexed with a tooth. Smell raphanoid.

**Agaricus (Flammula) astragalinus.** *Fr.*

Pileus fleshy, convex, then plane, discoid, at first silky about the margin, stem nearly hollow, flexuous, fibrillose or scaly, pallid; gills adnate, crowded, pallid, then yellow, at length ferruginous.—*Fries, Sys. Myc. p.* 251. *Weinm. p.* 209. *Fries, Epicr., p.* 187. *Smith, Journ. Bot.*, 1873, *p.* 336.

On pine stumps. Aviemore, N. B.

Taste nauseous and disagreeable, like *A. melleus*. A most beautiful species, resembling in colouring *Cortinarius cinnabarinus*.

**Agaricus (Flammula) inauratus.** *Smith.*

Pileus fleshy, 1 in. or more across, moist, smooth, furnished with a distinct veil; gills broad, adnate, with a decurrent tooth, pale yellowish clay colour, stem incurved, sub-hollow, clothed with innate scales; taste mild, insipid; whole plant sulphury-yellow.—*Sm. in Journ. Bot.*, 1873, *p.* 336.

On willows. North Wootton (C. B. P.).

Allied to *A. flavidus* and *A. Junonius*.

**Agaricus (Flammula) juncinus.** *Smith.*

Pileus fleshy, 1½ in. across, hemispherical, sulphury-yellow, with a rich brown disc; veil none, gills broad, very thin, red-brown; stem elongated, thin, 4 in. long, attenuated downwards, clothed with a few fibres; taste nauseous and disagreeable, somewhat bitter.—*Sm. in Journ. Bot.*, 1873, *p.* 336.

On dead bullrushes in an old clay pit. N. Wootton (C. B. P.).

Allied to *A. mixtus*.

**Agaricus (Naucoria) pusiolus.** *Fr.*

Pileus slightly fleshy, hemispherical, then expanded, obtuse, even, smooth, rather viscid; stem fistulose, filiform, smooth, yellow, shining; gills adnate, crowded, plane, pallid, then cinnamon.—*Fries, Sys. Myc., i.*, 264. *Fries, Epicr.*, 196. *Pers. Myc. Eur. No.* 272, *t.* 25, *f.* 1. *B. & Br. Ann. N. H.*, 1347.

On the ground. West of England.

Stem 1 in. or more, rather viscid, lemon-yellow. Pileus 3 lin., tawny-yellow.

**Agaricus (Naucoria) sobrius.** *Fr.* (Handbook p. 130.) *Var.* **dispersus.** *B. & Br.*

Pileus convex, ochraceous, delicately punctulate; margin furfuraceous; stem incrassated above or equal, furfuraceous, fistulose; ring appendiculate; gills pallid, adnate, plane.—*B. & Br. Ann. N. H.*, 1348. *Ag. dispersus, Pers.*

On lawns amongst short grass. July.

Pileus 3-4 lines across; stem ¾-1 in. high, 1 line thick; margin of gills white.

**Agaricus (Stropharia) Worthingtoni.** *Fr.*

(*Grevillea, ii., p.* 63.)

In pastures.

**Agaricus (Psalliota) inunctus.** *Fr.*

Pileus fleshy, soft, even, smooth, subumbonate, clad with an evanescent livid purplish gluten, growing paler; stem soft, flexuose, white, silky fibrillose below the distant fugacious ring; gills adnate, ventricose, pale brown.—*Fries, Elen., p.* 40. *Fries, Epicr., p.* 219. *Buxb. Cent.* iv., *t.* 4, *f. Saund. & Sm. Illust. t.* 29. *B. & Br. Ann. N. H.*, 1349.

In grassy places. Ely. Epping.

**Agaricus (Psalliota) merdarius.** *Fr.*

Pileus convex, then plane, obtuse, smooth, moist, hygrophanous; stem hollow, tough, short, flocculose, pallid when dry; ring torn, fugacious; gills adnate, broad, yellowish then umber.—*Fries, Sys. Myc. i.*, 291. *Fries, Epicr., p.* 220. *Buxb. Cent.* iv., *t.* 16, *f.* 2. *Saund. & Sm. Illus., pl.* 25. *B. & Br. Ann. N. H.*, 1350.

In a grass field. Sibbertoft.

**Cortinarius (Inoloma) traganus.** *Fr.*

Pileus fleshy, obtuse, fibrillose with lilac fibrils, then becoming smooth and discoloured; stem bulbous, spongy, violaceous white, saffron yellow within; gills emarginate, thick, crenate, distant, at first ochraceous saffron colour.—*Fries, Sys. Myc. i.*, 217. *Schæff. Icon. t.* 56. *Fries, Epicr., p.* 281. *Smith, Journ. Bot.* (1873), *p.* 336.

In pine woods. Forres.

Taste strong, not unpleasant, odour very powerful, like that of the larva of the goat-moth *(Cossus.)*

**Cortinarius (Phlegmacium) triumphans.** *Fr.*

Large, splendid; pileus fleshy, convex, then plane, obtuse, regular, when moist viscid, crystalline, yellow or ochraceous, when dry yellow, disc spotted with minute adpressed scales, or naked; margin even; stem solid, firm, ovate-bulbous at the base, attenuated upwards, striate, white, then yellowish, with tawny scales disposed in rings; veil partial; flesh compact, white; gills emarginate, crowded, with a decurrent tooth, whitish, then clay-coloured. *Fries, Mon. Hym., ii., p.* 4. *B. & Br. Ann. N. H., No.* 1350.* *C. sublanatus, Hussey, Myc. Illus.*

In moist woods. Oct.

Stem 3-5 in. long, $\frac{1}{2}$ in. and more thick. Pileus 3-5 in. broad. Gills 3 lin. broad.

**Cortinarius (Phlegmacium) porphyropus.** *Fr.*

Pileus fleshy, thin, even, virgate, viscid; stem stuffed, then hollow, thin, somewhat attenuated, flesh purplish when broken; gills emarginate, crowded, thin, violaceous-purple, at length cinnamon.—*Fries, Epicr., p.* 271. *Fries, Mon. Hym., ii., p.* 31. *B. & Br. Ann. N. H., No.* 1351. *Alb. & Schw., p.* 153.

In woods. Coed Coch. Oct.

Stem 2-4 in. long, 3 lin. thick, fragile, externally and internally violaceous, growing pale, then whitish. Pileus $1\frac{1}{2}$-3 in. broad, livid yellowish or clay-coloured.

**Cortinarius (Dermocybe) cinnabarinus.** *Fr.*

Pileus fleshy, obtuse, silky, then smooth, shining, stem stuffed, short, fibrillose, vermillion-red, gills adnate, broad, rather distant, darker.—*Fries, Epicr., p.* 287. *Fries, Mon. Hym., ii.*, 64. *B. & Br. Ann. N. H., No.* 1352.

In beech woods. Street. Oct.

An elegant species. Stem $1\frac{1}{2}$-2 in. long, 3-4 lin. thick; fibrillose or striate; pileus 2-3 in. broad, campanulate, then plane, silky, or obsoletely squamulose, vermillion, flesh firm, paler; gills adnate, subdecurrent; 3 lin. broad, connected by veins, edge unequal, darker.

**Cortinarius (Dermocybe) orellanus.** *Fr.*

Pileus fleshy, obtuse, umbonate, villoso-squamulose or fibrillose, tawny-orange, flesh similar, stem solid, firm, subequal, striate or fibrillose, tawny as well as the veil; gills adfixed, broad, rather distant, at length opaque.—*Fries, Epicr., p.* 288. *Fries, Mon. Hym., ii.*, 66. *Smith, Journ. Bot.*, 288. *Bull, Champ., t.* 598. *Var.*

In woods. Epping Forest, &c.

**Cortinarius (Telamonia) helvolus.** *Fr.*

Pileus rather fleshy, becoming plane, smooth, hygrophanous, ferruginous, then tawny, at length rimose, with an evanescent obtuse umbo; stem stuffed, attenuated, of the same colour, veil peronate silky, ending in a ferruginous annular zone; gills emarginate, thick, rather distant, opaque, tawny-cinnamon.—*Fr., Epic.*, 296. *B. & Br. Ann. N. H., No.* 1355. *Bull, t.* 531, *f.* 1. *Fries, Mon. Hym. ii., p.* 85.

In woods. Coed Coch. Sept.

Pileus 2-3 in.; stem 2-3 in. long, 2-4 lin. thick.

**Cortinarius (Telamonia) armillatus.** *Fr.* (Handbook No. 526, except reference to Hussey.)

*Fries, Mon. Hym. ii.*, 78. *B. & Br. Ann. N. H., No.* 1354.

In woods. Coed Coch.

**Cortinarius (Telamonia) hæmatochelis.** *Bull.*

Pileus fleshy, thin, gibbous, silky-fibrillose, tawny or pallid, testaceous; stem solid, attenuated above, with a rufous zone below the middle; gills adnate, crowded, rather narrow, pale cinnamon.—*Bull, t.* 527, *fig.* 1. *Hussey, Myc. Illus.*, referred to *C. armillatus* in *Cooke, Handbook, No.* 526. *B. & Br. Ann. N. H., No.* 1354. *Fries, Epicr., p.* 302.

In woods. Coed Coch.

**Cortinarius (Hygrocybe) decipiens.** *Fr.*

Pileus somewhat membranaceous, conical, smooth, shining, bay-brown (or testaceous), then rather fleshy about the umbo, which is darker; stem sub-fistulose, equal, slender, covered with a separable pallid cuticle, internally somewhat testaceous; gills adnate, thin, rather crowded, testaceous, or ferruginous.—*Fries, Epicr., p.* 312. *Pers. Sym.*, 298. *Fries, Sys. Myc. ii.*, 236. *B. & Br. Ann. N. H., No.* 1356. *Hoffm. Icon. An., t.* 9, *f.* 12.

In woods. Leigh Woods. Oct.

**Hygrophorus pratensis.** *Fr.* (Handbook No. 560.) *Var.* **Pallida.** *B. & Br.*

Pileus infundibuliform, pallid; margin undulated, deflexed; stem dilated, fibrilloso-striate; gills distant, decurrent, branched, pallid. —*B. & Br. Ann. N. H., No.* 1356.*

In grassy places. Coed Coch. Oct.

*Var.* **Meisneriensis.** *Fries, Mon. Hym. ii.*, 132.

Cinereous, stem often white, pileus thinner, margin at length striate.—*Smith, Journ. Bot.*, 1873, 336.

In grassy places. Largo, N.B.

**Hygrophorus livido-albus.** *Fr.*

Pileus fleshy, obtuse, even, smooth, viscid, livid, of one colour; margin naked; stem stuffed, equal, firm, nearly equal; gills thick, distinct, distant, white.—*Fries, Epicr.*, 324. *Fl. Dan., t.* 1904, *f.* 2. *B. & Br. Ann. N. H.*, 1357.

In woods. Street. Oct.

**Hygrophorus Clarkii.** *B. & Br.*

Fragile; pileus convex, sub-umbonate, livid, cinereous, viscid; margin even; stem concolorous, hollow; gills broad, distant, thick, adnate, white.—*B. & Br. Ann. N. H.*, 1358.

In woods. Street. Oct.

Gills in large specimens nearly $\frac{1}{2}$ in. wide.

**Hygrophorus fornicatus.** *Fr.*

Pileus fleshy, thin, campanulate, then expanded, even, smooth, viscid, livid white, stem firm, equal, tough, smooth; gills sinuate, adnexed, ventricose, distant, white.—*Fries, Epicr., p.* 327. *Batt., p.* 46, *t.* 21. *W. G. Smi., in Jour. Bot.*, 1873, *p.* 384.

In mossy places, near Hereford. Oct.

Pileus obsoletely umbonate, 1 in. broad, when broadly expanded nearly 2 in. broad. Stem 2-3 in. high, 4 lines thick.

**Hygrophorus metapodius.** *Fr.*

Pileus compact, convex, then expanded, obtuse, at first viscid, then squamulose, becoming tawny; stem solid, smooth, attenuated downwards; gills thick, distant, veined, white; arcuato-decurrent behind.—*Fries, Obs. ii., p.* 110. *Fr. Sys. Myc. ii.*, 109. *Fr. Epicr.*, 328. *Fr. Mon. Hym. ii.*, 135. *B. & Br. Ann. N. H.*, 1359.

In pastures. Street. Oct.

Stem 1-2 in. long, $\frac{1}{2}$ in. and more thick; pileus $1\frac{1}{2}$-3 in. broad.

**Hygrophorus Houghtoni.** *B. & Br.*

Pileus convex, bright coloured, at length depressed in the centre, striate, tawny yellow as well as the stem, transversely undulate, very viscid; gills decurrent, thin, grey.—*B. & Br. Ann. N. H.*, 1360.

Amongst grass. Preston, Salop. Oct.

Pileus $1\frac{1}{2}$-2 in. across; stem 2 in. and more high, $\frac{1}{4}$ in. thick, sometimes tinged above with blue; odour foxy. The gelatinous coat is extremely thick, and at length separates and forms a cup in the centre.

**Lactarius exsuccus.** *Smith.*

Pileus clothed with adpressed down, fleshy, depressed, with an involute margin; gills decurrent, white, shaded with verdigris, connected by veins and forked; stem white, very short, clothed with adpressed down; whole plant rigid and brittle, milkless.—*Smith, Jour. Bot.*, 1873, *p.* 336. *Lact. vellereus* var. *β. exsuccus. Fries, Sys. Myc. i. p.* 77. *Buxb. Cent. iv., t.* 4.

In pine woods, &c.

Smith observes that this plant can no longer be considered a mere variety of *L. vellereus*. The fruit of the two plants, as well as the general habit is very different.

**Lactarius minimus.** *Smith*

*Journ. Bot.*, 1873, *p.* 205, with figs.

In a small wood. Abergavenny. Oct., 1871.

**Russula subfœtens.** *Smith.*

Pileus bullate, subviscid, disc fleshy, margin submembranaceous; gills thick, distant, and branched; stem not so stout as in *R. fœtens*, smaller, odour somewhat disagreeable; taste slightly acrid.—*Smith, Journ. Bot.*, 1873, *p.* 337.

On the ground.

Smith observes that this is the plant referred to by Fries in Sys. Myc., i., p. 58, as a variety of *R. fragilis*, but that plant has crowded, thin, and generally entire gills, whilst those of the present plant are thick, distant, and branched. It is much nearer *R. fœtens.*

**Nyctalis caliginosa.** *Smith.*

Pileus very fleshy, white when dry, flocculoso-pruinose, when wet marked with colours (as in *Ag. butyraceus*); margin involute, slightly exceeding the gills, gills thick, branched, decurrent; stem solid, flocculoso-pruinose, base naked; odour and taste rank and disagreeable (like *Polyporus squamosus*). *Smith, Jour. Bot.*, 1873, *p.* 337.

Amongst earth and dead leaves. Highgate.

Closely allied to *N. parasitica*, but at once distinguished by its truly decurrent gills and other characters.

**Marasmius terginus.** *Fr.*

Inodorous. Pileus rather fleshy, convex, then plane, obtuse, shining, becoming whitish; stem fistulose, smooth above, shining, pallid, reddish below, villous and rooting; gills seceding, then free, rather crowded, narrow, pallid.—*Fries, Sys. Myc., ii.*, 128. *Fries, Epicr., p.* 377. *B. & Br. Ann. N. H.*, 1361.

Amongst leaves in a wood. Batheaston. Nov.

Pileus $\frac{5}{1\frac{1}{2}}$ in. broad, faintly striate, of a pale reddish brown, darker in the centre; stem about 3 in. high, $\frac{1}{2}$ line thick, smooth, pale-brown, satiny; gills reddish-ochre, adnate by a tooth, but sinuated, moderately distant.

## TWO SPECIES OF GEASTER.*

*By* Worthington G. Smith, F.L.S.

**Geaster Michelianus.** *W. G. S.*—Outer peridium pale buff, thick, fleshy, generally splitting into five or six sub-equal laciniæ, clothed on the outside with a thin, dark brown bark, which again splits into elegant honeycombed patterns; inner peridium pale slatey buff, spherical; mouth prominent, obtuse dentate, paler in colour than the body of the inner peridium; spores tuberculoso-echinulate.—*W. G. Smith, in Gard. Chron. No.* 18 (1873), *with fig. G. tunicatus Michelianus, Erbar. Critt. Ital. Nos.* 343 *and* 979. *Mich. t.* 100, *f.* 1. *Cooke Handb. No.* 1079.

On the ground.

Spores ·00014″ diameter. When mature, and when the outer peridium bursts, this plants sometimes throws itself 9 inches away from its place of growth. Plate XIII.

**Geaster lagenæformis.** *Vitt.*—Outer peridium splitting to the middle, in nearly equal acuminate laciniæ, inner stratum very thick, evanescent; inner peridium sessile, flaccid; mouth determinate, plano-conic, ciliato-fimbriate, columella rather long, clavate.—*Vitt. Monog. Lycop. t.* 1, *f.* 2. *Payer. f.* 519, 520.

On the ground.

In infancy the plant strongly resembles an antique jar with a narrow mouth, hence the specific name. Spores perfectly round and sphærical, thus differing from the majority of Geasters; they measure ·00012″ diameter. Plate XIV.

* For the use of the figures illustrating this communication we are indebted to the kindness of the Editor of the "Gardeners' Chronicle."

matrix, or imbedded in a stroma, of various shapes, membranaceous, and often diaphanous. The sporidia, simple, round or ovate, brown, opaque, surrounded or not by a gelatinous envelope, or appendiculated. The genus is for convenience divided into three subgenera—

1. Coprolepa = possessing a stroma.
2. Hypocopra = without any stroma, but having the sporidia involved in mucus.
3. Eusordaria = having appendiculated sporidia.

* "Die deutschen Sordarien," by George Winter, with 5 plates. Halle, 1873.
† F. Currey, "Linnean Transactions," xxiv., p. 318.
‡ F. Currey, "Linean Transactions," xxv., p. 254.

GEASTER MICHELIANUS W.G.S.

*Half actual size; section of inner peridium real size. Spores* × 700 *diam.*

Fig. 1.

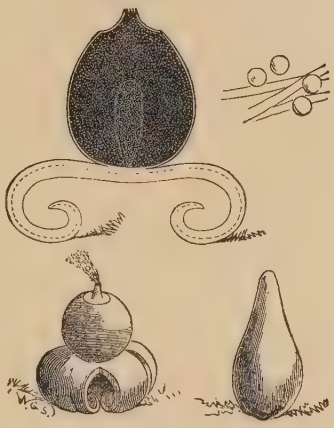

Fig. 2.

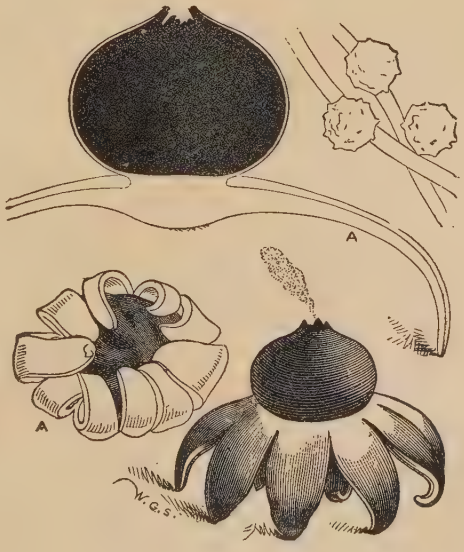


Fig. 1 GEASTER LAGENÆFORMIS. VITT.
*Half actual size: section real size: spores* × 700 *diam.*

Fig. 2 GEASTER HYGROMETRICUS. P.

vaginant at the rather broader base; the upper surface of cells, especially on the nerve, stongly papillose, but on the back smooth, except on the uppermost part of the nerve. Vaginula very short, ovate. Capsule wide-mouthed (almost with the form of *Funaria calcarea*, Wahl. = *F. hibernica*, Hook), when dry slightly rugulose. Annulus narrow, simple. Teeth of internal peristome less appendiculate, otherwise quite smooth. Spores rufous-brown. Calyptra as in the preceding species.—Andrœcium axillary among the innermost bracts of the perichætium, stipitate; bracts 12, very broad, very shortly acute, unequally serrate, of lax texture, the nerve-disappearing below the apex; antheridia shorter than the paraphyses, with the filament scarcely thickened.

Var. β, *norvegica*. Leaves, especially on the back of the base and on each surface of the nerve, with more elevated papillæ; cells twice larger, more empty, and subhyaline; comal leaves (bracts of perichætium?), with close and long articulated threads (paraphyses?) interposed, the cells one-half larger than those of the leaves, more chlorophyllose, and with more elevated papillæ. The plants hitherto have always been found sterile; nor are either male or female organs to be detected on any of my specimens.

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## BRITISH FUNGI.

*By the* Editor.

(*Continued from Page* 119.)

**Boletus inunctus.** *Krombh.*

Pileus pulvinate, depressed, fleshy, quite smooth, sub-umbilicate, pale cinnamon or yellowish brown, shining when dry, margin obtuse, tubes long, olive or greenish, free, orifice somewhat irregular, brownish, unequal, minute; stem obconic ochraceous above, finely reticulated, white and tomentose at the base, solid, flesh white, immutable.—*Krombholz, t.* 76, *f.* 10, 11. *B. & Br. Ann. N. H.*, 1362.

Amongst moss. Ascot, &c.

**Boletus sulfureus.** *Fr.*

Pileus compact, convex then plane, silky or tomentose with innate flocci, stem firm, ventricose, even, smooth, sulphur coloured; tubes adnato-decurrent, short, minute, sulphur coloured, at length becoming greenish.—*Fries, Epicr., p.* 413. *Smith, Journ. Bot.*, 1873, *p.* 337. *Fries. Mon. Hym. Suec., p.* 249.

Amongst sawdust in dense clusters. Aviemore, N.B.

Closely resembles *B. pachypus* var. *amarus* in general aspect, but in reality different. Taste mild and pleasant, colour golden sulphur. Spores oval.

**Boletus radicans.** *Fr.*

Pileus pulvinate, when dry subtomentose, olivaceous-cinereous then ash colour, margin thin, involute, stem attenuated, rooting, even, yellow, flocculose with a reddish powder, darker where touched, tubes adnate, broad, unequal, lemon yellow.—*Fries, Epicr., p.* 415. *Smith, Journ. Bot.*, 1873, *p.* 337. *Pers. Syn.*, 507. *Fries, Sys. Myc., i.*, 390. *Krombh., t.* 48, *f.* 1-6.

In woods. Staplehurst, Epping, &c.

**Boletus pachypus.** *Fries.* (Handbook, No. 718.) *var.* **amarus.** *Fr.*

Pileus becoming plane, even, growing pallid and whitish, stem nearly equal, scarcely reticulated, white.—*Fries, Epicr., p.* 417. *B. cyanescens, Cooke in Journ. Bot., vol.* 3., *t.* 30. *B. Elephantinus, Hussey, Illus.*

In grassy places.

**Boletus cyanescens.** *Bull.*

Pileus convexo-expanded, closely tomentose or floccose-scaly, opaque tan coloured, beeoming brownish, flesh compact, white, dark blue when broken; stem stuffed with a spongy pith, then hollow, ventricose, villoso-pruinose, of the same colour, constricted above, even, white; tubes free, minute, round, white, then yellow. —*Bull, t.* 369. *B. & Br. Ann. N. H.*, 1363.* *Saund. & Sm. Illus., t.* 47. *Barla., t.* 37, *f.* 1-7. *Fries, Epicr.*, 426.

Meadows and woods. East Budleigh.

The floccose coating which encloses the whole plant when young is very curious. The degree in which the flesh becomes blue is variable.

**Polyporus (Merisma) frondosus.** *Fr.*

Very much branched, between fibrous and fleshy, rather tough; pileoli very numerous, dimidiate, rugose, lobed, intricately recurved, dingy grey, stems concrescent, pores small, acute, white.—*Fries, Sys. Myc.* 355. *Fr. Epic. p.* 446. *Rostk. t.* 18. *Fl. Dan. t.* 952. *B. & Br. Ann. N. H.* 1364.

In woods at base of trunks. Berkshire, Oct. [Esculent.]

**Polyporus (Anodermei) mollis.** *Fr.*

Pileus between fleshy and fibrous, soft, effuso-reflexed, somewhat triangular, acute, rugose, flesh coloured; pores unequal, elongated, flexuous, soft, white, when touched spotted with red.—*Fries, Sys. Myc.* 360. *Fr. Epic.* 454. *B. & Br. Ann. N. H.*, 1365.

On rotten pine wood. Near Slough.

**Polyporus (Placodermei) carneus.** *Fr.*

Pileus woody, thin, hard, effuso-reflexed, rugose, smooth, not zoned, flesh-coloured, internally the same, pores minute, rounded, decurrent at the base.—*Nees Nova, Act. Nat. Cur.*, xiii. *t.* 3. *Fries, Epicr., p.* 471. *B. & Br. Ann. N. H.* 1366.

On an old stump. Welshpool, Nov.

**Dædalea mollis.** *Sommf.*

Resupinate, determinate, submembranaceous, pallid, at length

becoming tawny, pubescent beneath, umber, pores irregular, sinuous and lacerated.—*Fries El., p.* 71. *Fries, Epicr., p.* 495. *Weinm. Russ, p.* 345. *B. & Br. Ann. N. H., No.* 1361.*

On alder and birch. King's Lynn (C. B. P.).

**Hydnum compactum.** *Fr.*

Pileus corky, compact, undulated or tuberculose, not zoned, olivaceous grey or tawny, commonly covered with a whitish tomentum, internally blue, variegated, stem very short, irregular, brownish or tawny, spines becoming tawny, pallid at the tips.—*Fr. Fpicr.*, 507. *B. & Br. Ann. N. H.*, 1367. *Krombh., t.* 50, *f.* 12.

In heathy places Forres, N. B.

**Hydnum auxantiacum.** *A. & S.*

Pileus corky, compact, turbinate, or dilated, not zoned, orange, sometimes covered with a whitish down, internally zoned, stem short, orange, spines whitish, then tawny.—*Fr. Epic., p.* 508. *Alb. & Schw., p.* 265. *Flor. Dan., t.* 1439. *B. & Br. Ann. N. H.*, 1368.

In pine woods. Forres, N. B.

**Hydnum ferrugineum.** *Fr.*

Pileus between spongy and corky, soft, covered with a whitish tomentum, furrowed, dropping with blood-like tears, then more even, and internally ferruginous; stem unequal, spines tawny, becoming ferruginous.—*Fr. Sys. Myc.*, 403. *Fr., Epicr.*, 508. *Krombh, t.* 50, *f.* 10, 11. *Bull, t.* 409, *var. B. & Br. Ann. N. H,.* 1369.

In pine woods. Reading.

**Hydnum cirrhatum.** *P. (Grevillea, i., p.* 115). *B. & Br. Ann. N. H.* 1370.

On trunks. Epping.

At first snow white, but gradually acquiring a pale ochraceous tint; imbricated, confluent behind; aculei long; pileus rough, with abortive prickles.

**Corticium lacunosum.** *B. & Br.*

Soft, broadly effused; hypothallus woolly, tawny, lacunose; hymenium pulverulent.—*B. & Br. Ann. N. H.*, 1371.

On branches? Aboyne, Sept.

Spreading for several inches, and looking like a thin sponge from the numerous lacunæ.

**Cyphella catilla.** *Smith.*

Sub-membranaceous, expanded, margin crisped and undulated, hymenium veined, $\frac{3}{4}$-in. broad, grey, often imbricated.—*Smith, Journ. Bot.*, 1873, 337.

On moss and dead leaves. King's Lynn (C. B. P.).

Allied to *C. galeata.*

**Cyphella pallida.** *B. & Br.*

Cups at first orbicular, at length irregularly lobed, plane, tomentose, or hairy, sessile; hymenium at length rugose, pallid,

ochraceous.—*B. & Br. Ann. N. H.*, 1372. *Rabh. Fung. Eur. Ex.*. 1415.

On old stems of *Clematis vitalba*.

Cups $\frac{1}{4}$-1 line across, sometimes proliferous. Differs from *C. Curreyi* in the colour of the hymenium, which is rugose, like that of *Cantharellus muscigenus* and its more irregular form. It appears also not to be erumpent as that species often is, but is seated on the bark of wood. Spores ·00025-·00035 in. long, elliptic.

**Cyphella dochmiospora.** *B. & Br.*

Minute, pezizæform, snow white; spores oblique, ovate, slightly acute.—*B. & Br. Ann. N. H.*, 1373.

On sticks. (?) Batheaston, Oct.

Resembles externally *Peziza villosa*, but the hairs are not granulated. Spores ·0035-·0006 in. long.

**Clavaria rufa.** *Fr.*

Cæspitose, rufous, clubs stuffed, incrassated, somewhat bifid, acute.—*Fries, Epicr., p.* 577. *Flor. Dan., t.* 775, *f.* 1.

In grassy places. Hereford (W. G. S.).

**Clavaria curta.** *Fr.*

Small, very much branched, crowded together, greenish yellow, no distinct stem, branches short, crowded, straight, obtuse; spores white.—*Fries, Vet. Ac. Förh*, 1861. *Mon. Hym. Suec. ii., p.* 281. *Smith in Journ. Bot., Dec.*, 1873.

In grassy places. Hereford (W. G. S.).

Approaches *C. fastigiata*, but different in stature and colour.

**Dacrymyces macrosporus.** *B. & Br.*

Gelatinous, tuberculate, rosy; flocci septate, apex sporiferous; primary spores oblong, 3-5 septate, articulations constricted; secondary spores elliptical, apiculate at either extremity; conidia concatenate.—*B. & Br. Ann. N. H., No.* 1374, *t.* 7, *f.* 1.

On dead branches. Batheaston. Dec., Mar.

Forming irregular gyrate and tuberculated masses of a rosy colour, about $\frac{1}{4}$ in. long. parasitic on old *Diatrype stigma*. The mass of gelatine consists of delicate branched septate threads, mixed with shorter threads bearing oblong 3-5 septate primary spores ·0015-·002 in. long, ·00034-0004 in. wide; these at length fall off, and produce shortly stipitate secondary spores, one from each division; secondary spores elliptic, ·0005 in. long, more prominent on one side, pointed at either end. The cells of the primary spores are empty after the production of the secondary spores. Other threads break up into much branched chains of conidia ·0002 in. diam. The parts of the gelatinous mass where these are produced acquire a paler tint. It preserves its rosy tint when dry.

**Hydnangium carneum.** *Wallr.*

Subglobose, irregular, smooth, flesh-coloured; cells pale flesh colour, immutable; basidia prominent; spores spherical, echinulate; spinules long, slightly coloured.—*Tulasne Hypogæi, p.* 75, *t.* 21, *fig.* 3.

About the roots of Eucalypti. Edinburgh (Dr. Dickson).
Sporidia ·013-·014 m.m. diam.

**Lycoperdon echinatum.** *Pers.*

Peridium turbinate, substipitate, pale umber, or yellowish, rough with rather distant, stout, spiny warts; spores echinulate.—*Pers. Syn., p.* 147. *Pers. Desp., p.* 33. *B. & Br., Ann. N. H.*, 1375.
In woods. Berks.
Spores echinulate ·0002-·00025 in. diam.

**Scleroderma geaster.** *Fr.* (*Grevillea, i., p.* 40).—*B. & Br., Ann. N. H.*, 1375.*
Spores ·0003-·0005 in. diam.

**Geaster saccatus.** *Fr.* (*Grevillea, ii., p.* 77, *t.* xx.)
By hedge banks.

**Perichæna quercina.** *Fr.* (*Grevillea, i., p.* 40.)

External peridium crustaceous, becoming whitish; internal very thin, brownish-yellow, marked with impressed areolæ; flocci few; spores yellow, globose, rough.—*B. & Br., Ann. N. H.*, 1376.
On ash. Batheaston, Shrewsbury.
Spores ·0005 in. diam.

**Perichæna picea.** *B. & Br.*

Peridium dark brown, hemispherical, at length circumscissile; spores sub-globose, tawny and even, as well as the flocci.—*B. & Br. Ann. N. H.*, 1377.
On dead wood. Shrewsbury.
Looks at first like a *Perisporium*. The colour of the spores approaches that of those in the section *Hyporhodii* of *Agaricus*.

**Sphæronema æmulans.** *B. & Br.*

Perithecia sub-globose, arising from a sparse mycelium, neck ciliate at the apex; spores very minute, with Brownian movements.—*B. & Br. Ann. N. H.*, 1378, *t.* 7, *f.* 2.
Epping Forest. Feb.
Perithecia ·06 in. long; spores ·0001-·0003 in. dia. Possibly a pycnidiiferous state of some *Melanospora*.

**Uromyces Behenis.** *Lev.* (*Grevillea, i.*, 102.)
On *Silene inflata*. Aug.

**Puccinia Asteris.** *Fckl.* (*Grevillea, ii., p.* 48.)
On *Aster tripolium*.

**Puccinia Malvacearum.** *Corda.*

Hypophyllous, sori scattered, hemispherical, at first veiled in the centre by the persistent epidermis, circumference naked, umbilicate beneath; spores densely crowded, ovoid-oblong, brown, even, somewhat constricted in the middle, obtusely acuminate, on very long hyaline pedicels.—*Mont. Syll., p.* 314. *Corda Icones*, vi., *p.* 4, *t.* i., *f.* 12. *Grevillea, ii., p.* 47.
On mallow leaves. Australia. Chili.

**Monosporium saccharinum.** *B. & Br.*

Hyphasma gelatinous, coffee-coloured; flocci short, erect, sub-

clavate; spores obovate, fixed by the truncate base, pallid.—*B. & Br. Ann. N. H., No.* 1379, *t.* 7, *f.* 3.

Growing on decayed substances under glass. Batheaston. Feb.

Spores ·0004-·0005 in. long. Sometimes the tips of the threads have an articulation, and possibly form a second spore.

**Helminthosporium exasperatum.** *B. & Br.*

Flocci flexuous, nodulose above, fructiferous; spores oblong, obtuse at each end, triseptate.—*B. & Br. Ann. N. H.*, 1380, *t.* 7, *f.* 4.

On Sweet William. Sibbertoft.

Flocci knotted above, each knot bearing an oblong spore, ·0012-·0018 in. long, ·0004-·0005 in wide.

**Dactylium implexum.** *B. & Br.*

Flocci erect, interwoven; spores nearly cylindrical, apiculate at the base, terminal.—*B. & Br. Ann. N. H.*, 1381, *t.* 7, *f.* 5.

On the inside of a willow. Hereford.

Spores ·001-·0012 in. long.

**Dactylium melleum.** *B. & Br.*

Stratum thin, honey-coloured; flocci branched at the tips, branches bearing acute ramuli, with terminal uniseptate spores.—*B. & Br. Ann. N. H.*, 1382, *t.* 8, *f.* 6.

On decayed *Polyporus* or *Stereum*. Feb.

Spores ·0005 in. long. Approaching *Diplocladium minus*, of Bonorden.

**Dactylium Rennyi.** *B. & Br.*

Flocci sparingly branched above, branches crowned at the tips with clavate ramuli; spores elliptical, uniseptate.—*B. & Br. Ann. N. H.*, 1383.

On stumps. Hereford.

Very near *Diplocladium minus*, Bonorden, but the spore-bearing ramuli are obtuse above, slightly clavate, and attenuated.

**Peronospora ficariæ.** *Tul.*

Fertile threads 5-6 times dichotomous, ultimate and penultimate, ramuli arcuate and deflexed, ultimate subulate, conidia broadly ellipsoid, obtuse, epispore pale, violet-tinted. Oospores having the epispore of a pallid yellowish-brown.—*Tulasne. Comptes Rendus, Jan.*, 1854. *B. & Br. Ann. N. H., No.* 1399. *De Bary, Ann. des Sci. Nat.*, 1863, *xx.*, *p.* 117.

On *Ranunculus ficaria*. Forden. May.

**Peronospora lamii.** *De By.*

Fertile threads short, 5-7 times dichotomous, branches attenuated, patent, all more or less arcuate, ultimate ramuli acute, conidia distinctly pedicellate, globose-ovoid, obtuse, epispore pale dull violet tint; oospores small, brown.—*De Bary in Ann. des Sci. Nat.*, 1863, *xx.*, *p.* 120. *B. & Br. Ann. N. H., No.* 1400.

On *Lamium rubrum*. Forden. May.

Tufts dense, forming grey spots on the under surface of the leaves.

**Peronospora hyoscyami.** *De By.*

Fertile threads thick, 5-8 times dichotomous, branches patent, attenuated, straight or slightly curved, the ultimate forming a very obtuse angle, divergent, short, subulate, straight, acute; conidia small, ellipsoid, very obtuse, epispore pale violaceous.—*De Bary in Ann. des Sc. Nat., xx., p.* 120 (1863). *B. & Br. Ann. N. H., No.* 1401.

On common henbane. Market Deeping.

**Verticellium agaricinum.** *Bon.* (*Grevillea, i., p.* 184.)

On decayed Agarics.

[Plate 22, fig. 9. *a*, Upper portion of fertile thread. *b*, Spores. × 320 diam.]

**Verticillium aspergillus.** *B. & Br.*

Flocci simple below, or rarely divided, attenuated above, repeatedly furcate at the tips.—*B. & Br., Ann. N. H.*, 1384, *t.* 8, *f.* 7.

On decaying *Polyporus vaporarius*. Kelmarsh, Notts. Nov.

Threads ·0055 in. high; spores ·0001 in. long. The threads are occasionally divided below, in which case each branchlet is forked at the tip. The habit is that of *Chlonostachys araucaria*, Corda. It is worth enquiry whether this may not be a state of *Hypocrea farinosa.*

**Polyactis galanthina.** *B. & Br.*

Flocci above shortly branched, tawny; ramuli incrassated above; spores obovate, sessile; springing from elongated spicules.—*B. & Br., Ann. N. H.*, 1385, *t.* 8, *f.* 8.

On bulbs of Snowdrop.

Spores ·0006-·0007 in. long.

**Œdocephalum roseum.** *Cooke.* (*Grevillea, i., p.* 184.)

On old paper and rags.

[Plate 22, fig. 8. *a*, Fertile threads magnified. *b*, Spore further magnified.]

**Oidium microspermum.** *B. & Br.*

Pulvinules regular, ochraceous lemon-colour, flocci radiating, furcate; spores subglobose, concatenate.—*B. & Br., Ann. N. H.*, 1387.

On bark of Scotch fir. Batheaston. Nov.

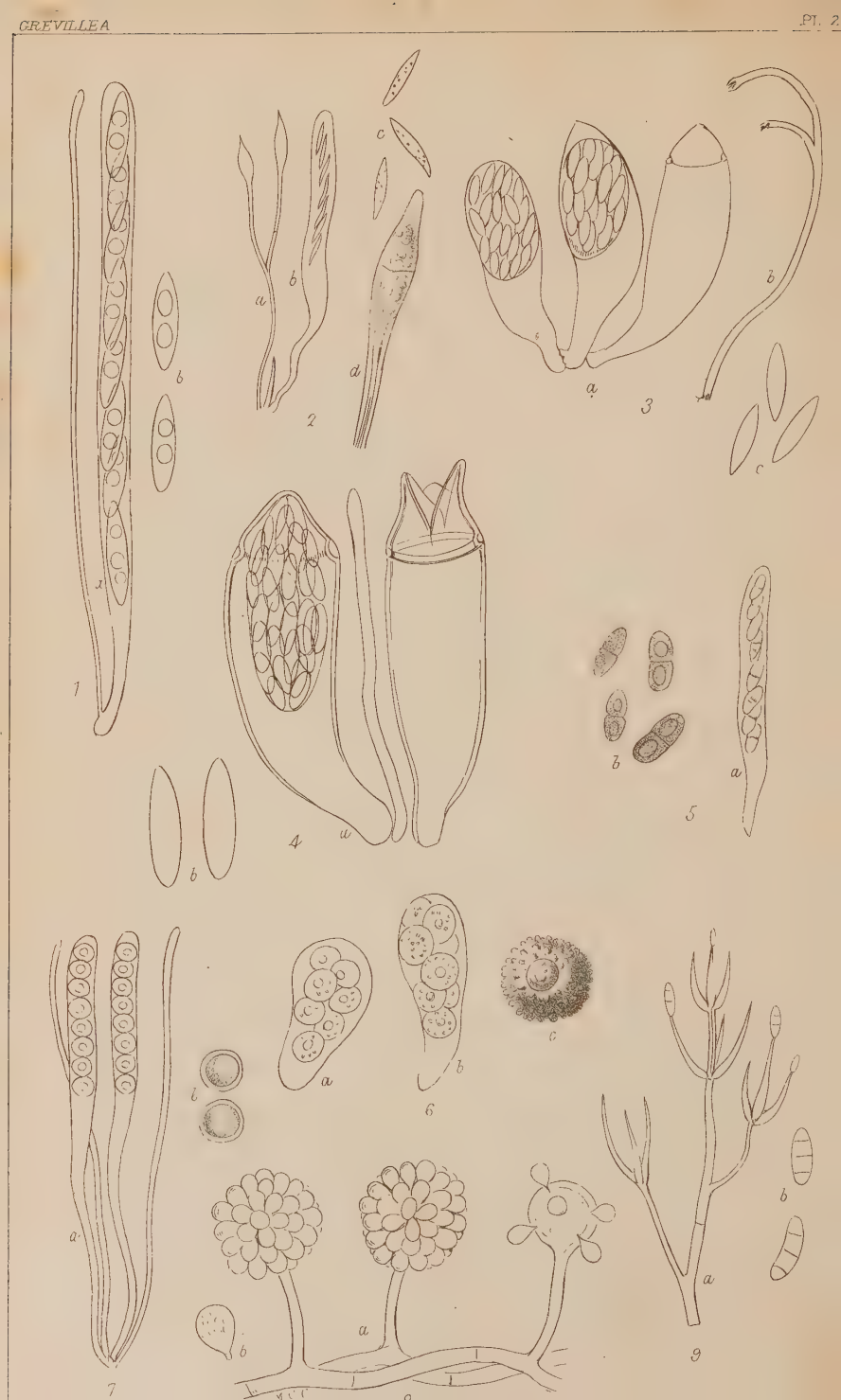
Spores ·0002 in. dia. Differs altogether from *O. aureum* and *O. fulvum* in the shape and size of the spores. Pulvinules at length confluent.

**Helicomyces roseus** *Link.*

Tufts effused, rosy.

*Link Obs. i.* 19. *Nees Sys.* 1., *f.* 37. *Link sp. i.*, 131. *B. & Br., Ann., N. H., No.* 1386. *Fuckel Exs., No.* 80.

On rotten trunks.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# Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

## BRITISH FUNGI.

*By the* Editor.

*(Continued from Page* 139.*)*

**Puccinia Bistortæ.** *D.C.*

Spots none ; sori scattered, minute, numerous, rufous, hypophyllous, suborbicular, spores ovoid or oblong, obtuse, rounded, bright brown, stem very short.—*De Can., Flor. Fr.* v. 61. *Corda Icon.* iv., *f.* 61. *Libert. Exs., No.* 91. *Puccinia vivipara, Grev., MSS.*

On leaves of *Polygonum viviparum*, near Mar Lodge. Aug., 1822 (Dr. Greville). On *Polygonum Bistorta*, near Liverpool. *(R. McL.)*

**Uromyces excavata.** *D.C.*

Spots none or yellowish ; sori scattered, surrounded by the inflated epidermis ; spores brown, obovate, shortly pedunculate and sessile.—*Uredo excavata, D.C., Fl. Fr., vol. ii., p.* 227. *Berk. Exs. No.* 119. *Cœoma excavum, Lk. sp. ii.*, p. 34.

On *Euphorbia exigua*, in company with *Æcidium Euphorbiæ.*

King's Cliff, Norths.

Omitted in Berkeley's "Outlines" and Cooke's "Handbook," through oversight.

**Æcidium Parnassiæ.** *Graves.*

Hypophyllous, spots pallid, cups laxly disposed in subrotund tufts, yellowish-brown, urceolate, margin thick, nearly entire, spores pallid.—*Graves, in Duby. Bot. Gall., ii.*, 904.

On leaves of *Parnassia palustris.* Near Glasgow. (Dr. Greville.)

This will follow No. 1626 in the "Handbook of British Fungi."

Synchytrium. *De Bary.*

Cellules often numerous, aggregated, involved in a common membrane, forming sori, endochrome orange, delicately granulose ; zoogonidia globose, rarely oval or oblong.—*Rabh. Algæ Europ., ii.*, 284.

Entophytal, with the habit of *Uredo*, seated in the parenchyma of terrestrial plants.

**Synchytrium taraxaci.** *De By. & Wor.*

Cellules variable, seated beneath the cuticle of living leaves.—*Cohn's Beitrage, p.* 39. *B. & Br. Ann. N.H.*, 1388.

On leaves of common dandelion. Batheaston.

Zoogonidia ·00013 m.m. diam.

**Synchytrium mercurialis.** *Fuckel.*

Tubercles confluent on the nerves of the leaves, hemispherical, greenish, depressed above, umbilicate; sori oblong, grey; zoospores globose, uninucleate, hyaline.—*Fuckel F. Rhen., No.* 1607. *Schroet in Cohn's Beitr., p.* 40. —*B. & Br. Ann. N. H.*, 1389.

On leaves of *Mercurialis perennis.* Batheaston. April.

Spores echinulate, ·0012-·0015 in.

**Synchytrium anemones.** *Wor.—Schroet in Cohn Beitr., p.* 40. *B. & Br. Ann. N.H.*, 1389.* *Chytridium anemones, D'By., in Rabh. Algæ Eur. ii., p.* 284.

On leaves and petals of *Anemone nemorosa.*

**Spilocæa pomi.** *Fr.*

Spots often confluent, at first covered by the thin cuticle, which is soon broken and evanescent; spores densely adnate, subglobose or oval.—*Fries Sys. Myc. iii.*, 504. *Grevillea, ii., p.* 64.

On apples.

Doubtless only a condition of *Cladosporium.*

**Mitrula alba.** *Sm.* (*Grevillea, i., p.* 136, *t.* x., *fig.* 7.)

Amongst submerged leaves.

**Vibrissea Margarita.** *White.*

Simple, head orbicular, orange-red, margin hisped, stem cylindrical, hirsute with black articulated hairs, internally white. Asci and sporidia ?—*Buchanan White, in "Scottish Naturalist" for Jan.*, 1874.

On dead sticks. Sept. Oct.

**Rhizina lævigata.** *Fr.*

Orbicular, even, brown, margin prominent, granulose beneath, fibrils pallid; asci cylindrical; sporidia broadly fusiform, acuminate, binucleate, uniseriate, hyaline.—*Fries Sys. Myc., ii.*, 33. *Octospora rhizophora, Hedw. Musc. Frond, ii., t.* 5, *f.* A.

On stumps,

[Plate 22, fig. 1. Ascus with sporidia and paraphysis. *b*, sporidia × 320.]

**Peziza (Aleuria) isabellina.** *Sm.* (*Grevillea, i., p.* 136, *t. ix., fig.* 1-4.)

On decayed coniferous wood.

**Peziza (Aleuria) undata.** *Sm.* (*Grevillea, i., p.* 136, *t. x., figs.* 1-6.)

On tree-fern stems.

**Peziza (Humaria) Chateri.** *Sm.* (*Grevillea, i., p.* 120, *t. viii, f.* 1-2.)

**Peziza (Mollisia) Bullii.** *Sm.* (*Grevillea, i., p.* 120, *t. viii., f.* 3.)

**Peziza (Dasyscypha) lasia.** *B. & Br.*

Cups globose, erumpent, orange, at length opening with a torn, dentate mouth, externally gummy; asci elongated; sporidia fusi-

form, paraphyses urn-shaped above, sometimes uniseptate, intermixed with short flocci.—*B. & Br. Ann. N. H.*, 1391, *t.* 8, *f.* 10.

On elm. Langridge. Mar.

Cups smaller when on bark; sporidia ·0005 in. by ·0001 in.

[Plate 22, fig. 2. *a*, paraphysis; *b*, ascus with sporidia; *c*, sporidia; *d*, tip of paraphysis.—*B. & Br.*]

RHYPAROBIUS. *Boudier.*

Cups very minute, scarce conspicuous to the naked eye, waxy, marginate, sessile; disc plane; asci prominent; when dry margin inflexed, rounded; paraphyses rare, short, septate; asci minute but broad, polysporous, dehiscing with a convex operculum; sporidia very minute, hyaline.—*Boudier, Mem. Asc., pp.* 47.

**Rhyparobius dubius.** *Boud.*

Scattered, just conspicuous under a lens, pale grey or tawny, pellucid, rounded; margin not distinct; asci oblong or oblong-ovate; sporidia 128 (?), oblong-ovate, minute, hyaline.—*Boud. Ann. Sci. Nat.* (1869) x., *p.* 240. *B. & Br. Ann. N. H.* 1392.

On rabbit's dung. Bathford.

**Rhyparobius Cookei.** *Boud. (Grevillea, i., p.* 132.) *B. & Br. Ann. N. H.* 1393.

On dog's dung. Batheaston.

**Rhyparobius argenteus.** *B. & Br.*

Very minute, silvery white, ciliated with soft hairs; asci short; sporidiiferous cysts elliptic, seated towards the apex; sporidia fusiform; paraphyses furcate.—*B. & Br. Ann. N. H.*, 1394, *t.* 9, *f.* 11.

On rabbit's dung; for the most part attached to filaments of *Mucor*.

Cups ·004 in. across; asci ·004 in. long; sporidia normally 64 in each cyst ·0007 in. long, ·00025-·0003 in. wide. Scarcely visible to the naked eye; asci opening with a little lid, which splits vertically. Comes near to *R. felinus*, B, but has soft hairs, and is of a pure white; tips of paraphyses slightly enlarged.

[Plate 22, fig. 3—*a*, asci with cyst; *b*, paraphysis; *c* sporidia.—*B. & Br.*]

**Rhyparobius woolhopensis.** *Renny.*

Minute, scattered, at first pure white, then dingy; cups with a thick stem-like base, which is tuberculate, covered above with close-set hairs which fringe the margin, at length expanding, the hairs disappearing with age; substance of base vesicular; paraphyses simple; asci clavate; sporidia fusiform (normally 64).—*B. & Br. Ann. N. H., No.* 1395, *t.* 9, *f.* 12.

On bird's dung, mixed with filaments of *Mucor*.

Cups $\frac{1}{2}$ line (·041 in.) high; sporidia ·0007 in. long; cells of base often ·0015-·0018 in. long.

[Plate 22, fig. 4—*a*, ascus with cyst; *b*, sporidia.—*B. & Br.*]

**Bulgaria purpurea.** *Fckl.*

Receptacles as in *Bulgaria sarcoides*, but larger and more robust;

asci scarcely stipitate, cylindrical; sporidia biseriate, lanceolate, sometimes curved, multinucleate, hyaline; paraphyses filiform, not thickened at the tips. *Coryne purpurea*, *Fckl. Sym. Myc.*, *p.* 284. *Fckl. Fungi Rhen.*, *No.* 1135.

On rotten wood. Epping.

Sporidia (·0007 in.) ·02 m.m. long, whereas in *B. sarcoides* they are only half that length. The cups exceed 1 inch in diameter.

**Dothidea filicina.** *Fr.* Cooke's "Handbook of British Fungi," No. 2427.

The description of the fruit in the work above quoted is erroneous, as I find upon re-examination. It should be as follows:—

Asci elliptical; sporidia biseriate, broadly fusiform, straight or curved, 3-5 septate, constricted, with a short apiculus at either end, amber-coloured, ·0014 in. long.

**Nectria citrino-aurantia.** *Lecr.*

Cæspitose, pale orange; perithecia very minute.—*Lecr. in Desm. exs. ii.*, *No.* 778. *Rabh. Fung. Eur.*, *No.* 325. *Tul. Sel. Fung. Carp. Vol. iii.*

On sticks. Batheaston (C. E. Broome).

Remarkable for the exceedingly minute perithecia.

**Sphæria (Pertusæ) pædida.** *B. & Br.*

Perithecia ovate, rugose, opaque, free, brownish-black; ostiolum conical, at length deciduous; asci linear; sporidia uniseriate, contracted in the middle.—*B. & Br. Ann. N. H.*, *No.* 1396, *pl.* x., *f.* 13.

On beech. April.

Quite superficial, confluent; sporidia ·0005-·0006 in. × ·0002-·0003 in.

[Plate 22, fig. 5—*a*, ascus with sporidia; *b*, sporidia.—*B. & Br.*]

**Sphæria (macrospora) Scirpi.** *Fckl.* (*Grevillea*, *ii.*, *p.* 48.)

On *Typha*. May.

**Sphæria (Immersæ) nigrofactæ.** *Cooke.*

Gregarious, on blackened spots. Perithecia globose, opaque black, rough, immersed or semi-immersed, ostiola thick, prominent, sometimes alone appearing above the surface of the matrix; asci cylindrical, tetrasporous, sporidia linear, multiseptate, yellowish. Paraphyses slender, hyaline, simple.

On old cabbage stems. Eastbourne (C. J. Muller). April.

Allied to *Sphæria bacillata*, C., but perithecia nearly double the size, the sporidia are not much more than half as long (·0045 in.) and appear to be always limited to four in an ascus.

SCHIZOTHYRIUM. *Desm.*

Perithecia sessile, simple, rather fleshy, rounded or ovate, flattened or slightly convex, minute, punctiform, dehiscing by a longitudinal fissure; nucleus gelatinous; asci fixed, erect; sporidia ovoid.—*Desm. Ann. Sci. Nat.* (1849), xi., 360.

**Schizothyrium Ptarmicæ.** *Desm.*

Innate, black, somewhat shining, rounded or ovate. Asci cylin-

drical, or somewhat clavate ; sporidia minute, ovoid.—*Desm., Ann. des Sci. Nat.* (1849), *xi.*, 360. *Labrella ptarmicæ, in Grevillea, ii.*, 57.

On *Achillea Ptarmica.*

**Sphinctrina coremioides.** *B. & Br.*

Perithecia stipitate, globose, externally setulose ; hymenium downy from the projecting paraphyses ; asci linear, soon absorbed ; sporidia globose, concatenate.—*B. & Br., in Gard. Chron.*, 1872, *p.* 40, *with fig. B. & Br. Ann. N. H., No.* 1398.

On pear roots. Painswick. Nov.

Sporidia ·00025 in. ·006 m.m. diam., forming chains at the tips of the elongated pedicels of the asci, which are soon absorbed.

**Phacidium radians.** *Rob.*

Erumpent, black ; receptacles minute, rounded, or oblong, globose, then flattened, solitary and scattered, or confluent in radiating lines ; disc fuliginous. Asci clavate ; sporidia oblong, straight, or slightly curved.—*Desm , in Ann. des Sci. Nat.* (1842), *xvii. p.* 116. *Rickx. Flor. Hand.* 1, *p.* 459.

On living leaves of *Campanula patula.* Summer. Near Worcester *(Edwin Lees).*

Sporidia (·00035 in.) ·01 m.m. long.

**Chætomium rufulum.** *B. & Br.*

Perithecia subglobose, cellular, rufous, springing from a thin mycelium; asci short, obtuse, sporidia eight, globose, granulate, biseriate.—*B. & Br. Ann. N. H., No.* 1397, *pl. x., fig.* 14.

On a paper box under a bell glass. April.

Sporidia when young, ·0004-·0005, mature, ·0007 in. Perithecia globose, with a pointed apex, composed of about three rows of coarse cells, of a pallid ochre at first, attached by a few threads. Ostiolum (if any) very inconspicuous ; asci mostly curved, obtuse at either end, the narrow base soon losing all signs of attachment and floating freely in the perithecium ; sporidia spherical, strongly granulated, of a pale-brown tint, containing a small nucleus.

[Plate 22, fig. 6.—*a*, *b*, asci ; *c*, sporidium.—*B. & Br.*]

**Chætomium glabrum.** *B.* (Cooke " Handbook," No. 1934.)

Asci linear ; sporidia globose, uniseriate, smooth, (·0005 in.) ·0127 m.m. diam.—*B. & Br. Ann. N. H., No.* 1397,* *t, x., fig.* 13.

On the same matrix *Lycogala parietinum* occurs, and we have little doubt that it is a mere state of the *Chætomium.* The asci are mixed up with yellow threads, and it is probable that, as in other *Chætomia* they are often absorbed, leaving the sporidia free, and thus appearing to be the spores of a *Myxogaster.*

[Plate 22, fig 7.—*a*, asci with sporidia and paraphyses ; *b*, sporidia.—*B. & Br.*]

**Ailographum vagum.** *Desm.*

Receptacles innate-superficial, amphigenous, scattered, elliptic, ovate, or linear, simple or furcate, black, opaque, lips closely con-

nivent when dry, acute, asci elliptical; sporidia very minute, hyaline, oblong, simple.—*Desm. Ann. Sc. Nat.*, 2 ser., *xix.*, *p.* 362. *Duby, Hist.*, *p.* 38.

On dry coriaceous leaves, as holly, ivy, &c. Epping.

Perithecia scarcely visible to the naked eye.

*By* Wm. Phillips and Charles B. Plowright.

(with plates 24 and 25.)

We propose in this and subsequent papers to record the occurrence of such species of fungi not hitherto found in Britain as may come under our own immediate notice; also the occurrence in new localities of some of the rarer British species, which have already appeared in the invaluable series of papers by Messrs. Berkeley and Broome, in the "Annals and Magazine of Natural History."

1. **Diplodia Syringæ.** *Awd.* Fckl. Symb. Mycol., *p.* 395. Cooke's exs., Cent vii.

On *Syringa vulgaris.* Shrewsbury.

2. **Ramularia armoraciæ.** Fckl. Symb. Mycol., *p.* 361. Thümen Herb. Mycol. Æconom., No. 27. On the leaves of horseradish. North Wootton, June, 1873.

3. **Ascochyta armoraciæ.** Fckl. Symb. Mycol., p. 388. Thümen Herb. Mycol. Æconom., No. 23. Cooke, Exs., Cent vii.

On horseradish leaves, North Wootton, Sept., 1874. Obviously a more advanced condition of the preceding.

* **Thecaphora hyalina.** Fing. On the fruit of *Convolvulus sepium.* King's Lynn. Dr. J. Lowe. C. B. P.

4. **Helminthosporium arundinaceum.** Corda. Ic. III. 10, tab. 2, fig. 25. Fckl. Symb. Mycol., *p.* 354.

On the leaves of *Phragmites communis.* King's Lynn, August, 1873, abundantly. Cooke, Exs., Cent vii.

5. **Peziza (Phialea) Strobilina,** Fr., S.M. II., *p.* 125. Rabh. F. E., 222. Krst. Pez. Asc., *p.* 30. Nyl. Pez. Fenn., *p.* 41.

Pyriform, firm, cupula concave, pallid, rufescent, margin tumid, entire; stipes short, black.

Sporidia oblong or fusiform, simple, ·0,008-·0,012 × ·0,0025 millim. Nyl.

On fir cones. Derbyshire. (Mr. J. Renny.) North Wootton. C. B. P.

* **Ascobolus viridis.** *Curr. Lin. Trans.* xxiv., p. 154.

On a clay bank, Wrekin, Shropshire. July, 1873.

6. **Ascobolus atro-fuscus,** n. s. (*A. viridis*, Boud. Ann. Sc. Nat., 1869. x., *t.* 5, *f.* 4.?)

Sessile, crowded or scattered, blackish-brown, concave, then plane, margin crenulate, externally furfuraceous; asci clavate; sporidia broadly elliptical, obtuse, hyaline, then purple, at length brown, epispore granulated or verrucose; paraphyses linear, occasionally branched. Sporid. ·001 × ·0005.

On a charcoal bed, the Wrekin, Shropshire. July, 1873.

We have little doubt of this being the same plant as that referred by M. Boudier (l. c.) to *A. viridis*, *Curr.*; it differs, how-

ever, so much in sporidia, colour, and habitat, from Mr. Currey's species that we venture to consider it distinct.

*Plate* 24, *fig.* 1. *a.* plants nat. size; *b.* section of one enlarged; *c.* ascus and paraphyses magnified; *d.* sporidia.

* **Ascophanus carneus.** Var. **Cuniculi.** *Boud.* Ann. Sc. Nat., 1869, *t.* 12, *f.* 39.

This differs from the normal form in its dirty-orange or orange-flesh colour, rather smaller size, paraphyses always colourless, and growing on rabbits' dung. Sporid. ·0006 × ·0004.

Near Shrewsbury, Dec., 1873.

7. **Cenangium Laricinum.** *Fckl.*

*Pycnidia. Cenangium bullatum.* Alb. and Schw. Consp., *p.* 344. c. *Pinastri*, b. *monstrosum*, Fr. Sys. M. *ii.*, *p.* 184.

Cupula round, closed, then perforated, black, rugulose, stylospores long, filiform, slender, curved.

*Ascophore.* Fckl. Sym. Myc., *p.* 270.

Scattered or cæspitose, as in *Cen. Pinastri*, but totally black; asci filled with spermatia-like corpuscules.

On larch poles. Near Shrewsbury. Nov., 1873.

8. **Sphæria (Sordaria) discospora.** Awd.—Perithecia scattered, minute, globose, with an obtusely conical ostiolum, covered by dense, black, short, rigid setæ, asci cylindrical, somewhat truncate at the apex, sporidia involved in mucus, subrotund. discoid, dark-brown or black, ·012 m.m. (·0004 in.) in diameter, ·003 ·005 m.m. (·001 in.) thick. Niessl. Beiträge der Pilze., *p.* 42. T. vi., *fig.* 44. Fckl. Symb. Mycol. Nachträg II., *p.* 43. Winter. Deutsch Sord., *p.* 19, *t.* VIII., *f.* 8.

On rabbits' dung. North Wootton. Dec., 1873. Known immediately by its disc-shaped sporidia.

*Plate* 25, *fig.* 2. *a.* plant magnified; *b.* asci and paraphyses, more highly magnified; *c.* sporidia separated from the ascus with their mucus envelope.

9. **Sphæria (Sordaria) breviseta.** *Rbh.*
**Sphæria (Sordaria) conica.** *Fckl.* } These two species have been united by Herr Winter in his monograph of *Sordaria*, as species and variety *(coronata)* of De Bary's *Sordaria curvula*. Not having seen authentic specimens, we think it best simply to record their occurrence without binding ourselves to any generic name. It is worthy of remark, however, that the presence or absence of one or both the appendages, even in the same perithecium, is liable to considerable variation. Appended is a list of references bearing upon the plants in question:—*Sordaria curvula*, De Bary. Morphol. der Pilze, *p.* 209; *Sphæria fimiseda* (De Not.), Fckl., Fung. Rhen., No. 2037; *Sordaria appendiculata*, Awd.; *Cercophora conica*, Fckl. Symb. Mycol., *p.* 245 & 243 (Sub. *Malinvernia breviseta*, Fckl.); *Ixodiopsis fimicola*, Kars., Fungi Fenn., No. 955; *Schizothecium fimicolum*, Corda, Icones, *t.* II., *p.* 29; *Hedwigia*, No. 11, 1873. *Winter*, Deutschen Sordarien, *p.* 38, *tab.* XI., *fig.* 22.

10. **Sphæria carbonaria.** n. s.

Crowded, globose, semi-immersed, having an obtuse rugulose ostiolum, clothed at the base with branched septate hyaline threads; asci cylindrical, commonly truncate at the apex; sporidia almond-shape, dark-brown, with a very short hyaline tail, uniseriate; paraphyses linear. Sporid. ·0009 × ·0003.

On burnt ground, near Shrewsbury, 1873.

This appears to be allied to *S. rotula*, Cooke.

*Plate* 25, *fig.* 3. *a.* perithecia in the ground, magnified; *b.* asci and paraphyses; *c.* sporidia; *d.* mycelium clothing the base of the perithecia.

11. **Sphærella Iridis.** *Gon. & Rabh.* Myc. Eur. *t.* 5. *f.* 71.

Amphiginous, black, at first covered by the epidermis, then somewhat free, scattered, depresso-globose, pierced with a simple minute pore; asci obovate-oblong, attenuated at the base into a short stem, sporidia 8, subtriseriate, oblong, rounded at the ends, straight, uniseptate, not constricted at the septum, epispore thick, 17 × 4-5 mic.

On dead leaves of *Iris pseudacorus*. Near Shrewsbury, Nov. 1873.

12. **Sphæria (Delitschia) Winteri.** n. s.

Perithecia immersed, spherical, black; ostiolum elongated, cylindrical, tuberculose, rugulose, frequently somewhat curved; asci cylindrical, octosporous. Sporidia involved in mucus, uniseptate, black-brown, elliptical.

On rabbits' dung. North Wootton, Dec., 1873.

The perithecia are completely immersed in the matrix, only the tip of the ostiola being visible. The sporidia are at first greenish-yellow, then clear brown, becoming eventually almost black, when young surrounded by a gelatinous envelope, which subsequently disappears. They exhibit a tendency to fall in halves at the septum, ·003 in. long by ·001 in. wide (·062 m.m.-·028 m.m.).

Dr. George Winter, to whom specimens were submitted, considers it distinct from all its allies, and adds, "it approaches nearest to *D. chætomoides*, Karst., Fungi Fennici. Exs.

*Plate* 25. *a.* perithecia enlarged; *b.* ascus and sporidia; *c.* three sporidia.

13. **Cucurbitaria Dulcamaræ.** *Fr.* Fuckel Symb. Mycol., *p.* 175, Fr. S. V. S. *p.* 391.

*Sphæria dulcamaræ*, Kunze & Schm., Myc. Heft. *i.*, *p.* 62. *Sphæriacei Brit.* Cent. *ii.* (inedit.)

On dead stems of *Solanum dulcamara*, in company with a *Hendersonia*, which doubtless bore some connexion with it, as a secondary form of fructification.

King's Lynn, Jan., 1874.

* **Stemonitis pulchella.** *Bab.* Cooke's "Handbook," No. 1160.

Church Stretton, Salop, Dec., 1873.

* **Peziza pustulata.** *Pers.* Cooke's "Handbook," No. 1986.

Sporidia .0006 × ·0003. Tips of asci bright-blue with iodine.

On charcoal beds, the Wrekin, Salop, 1873.

*Plate* 24, *fig.* 2, asci, paraphyses and sporidia, magnified.

* **P. Saniosa.** *Schrad.* Cooke's "Handbook," No. 1991.

The hymenium when wounded exudes a purple juice. The tips of the asci become blue with iodine. Sporidia ·0006 × ·0003, with two or more nuclei.

This species is of very rare occurrence; one specimen only was found near the Wrekin, Salop, July, 1873.

*Plate* 24, *fig.* 3. Nat. size of plant with section; *fig.* 2 *f.*, ascus, paraphyses and sporidia.

a
b
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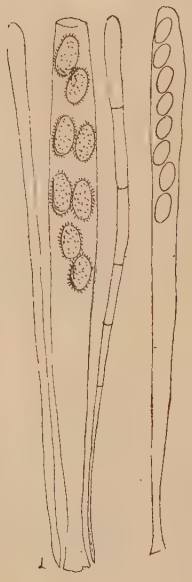
c

d



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3

# NEW BRITISH FUNGI.

*By* M. C. Cooke.

[*Continued from Vol. II., p.* 166.]

**Phoma errabunda.** *Desm.*

Perithecia erumpent, minute, very numerous, crowded or scattered, globose, black, somewhat shining, at length depressed, corrugated, ostiola papillate, pierced; spores very minute, oblong, obtuse.—*Desm. Ann. des Sci. Nat.*, 1849, *vol. xi., p.* 282. *Cooke Fungi Britt., No.* 619.

On stems of *Verbascum*, &c.

**Phoma subordinaria.** *Desm.*

Perithecia minute, numerous, subseriate, ovate, convex, covered by the cuticle; ostiola minute, naked, then deciduous; spores oblong.—*Desm. Ann. des Sci. Nat.*, 1849, *vol. xi., p.* 284. *Cooke Fungi Britt., No.* 617.

On *Plantago lanceolata.* King's Lynn (*C. P. B.*).

**Diplodia syringæ.** *Awd.*

Somewhat gregarious, sometimes in irregular lines, cortical; perithecia globose, black, ostiola rather prominent, elevating and piercing the cuticle; spores elliptical, at length uniseptate and coloured.—*Fckl. Fungi Rhen.*, 1950. *Cooke Fungi Britt., No.* 626.

On twigs of *Syringa vulgaris.* King's Lynn (*C. B. P.*).

**Sporidesmium cladosporii.** *(Corda) Fckl.*

Effused in dark olivaceous patches; spores ovoid, cellular, at length brown and opaque.—*Corda Icon. i., fig.* 118. *Fckl. Fungi Rhen., No.* 110. *Cooke Fungi Britt., No.* 679.

On stems of *Scrophularia.* Darenth, &c.

Corda was of opinion that this was parasitic on species of *Cladosporium.* Our specimens accord with those published by Fuckel, but we are doubtful as to its parasitism.

**Phragmidium bullatum.** *West.*

Epicauline. Sori elongated, pulvinate, for a very long time covered with the epidermis, which is rendered bullate, then fissured irregularly, and ultimately thrown off. Pseudospores cylindrical, 5-7 septate, mucronate at the apex, epispore rough, pedicel short, hyaline, rather thickened at the base.—*Westendorp, Bull. des Brux. 4 notice, No.* 44. *West. & Wall, Herb. Belge, No.* 1069. *Kickx. Flor. Fland., ii., p.* 69.

On twigs of *Rosa canina.* Barnet.

Quite distinct from *Phragmidium speciosum*, Fr., which is also epicauline, but with shorter pseudospores and much longer pedicels.

**Ramularia armoraciæ.** *Fckl.*

Tufts lax, white, seated on a bleached orbicular spot; flocci fasciculate, simple, conidia cylindrical, somewhat ventricose, simple.—*Fckl. Sym. Myc., p.* 361, *t. i., fig.* 24. *Cooke Fungi Britt., No.* 638. *Grevillea, Vol. ii., p.* 186. *Oidium fusisporioides, Fckl. Fungi Rhen. No.* 133.

On leaves of horseradish. King's Lynn (*C. B. P.*).

This is undoubtedly the conidia, of which *Ascochyta armoraciæ (Depazea Brassicæcola*, Fr.) is the stylosporous condition, and *Sphærella Brassicæcola*, Not. ("Handbook," No. 2768), the ascophorus state.

**Macrosporium cladosporioides.** *Desm.*

Effused, forming large patches, irregular, velvety, dark olive. Flocci simple, nodulose, septate, united in fascicles. Acrospores somewhat pellucid, often torulose, unequal, ovoid, oblong or clavate, cellular.—*Desm., in Bull. Soc. Bot. Fr.* (1857). *West, Bull. Soc. Bot. de Belg., ii., p.* 251. *Kickx. Flora ii.*, 295. *Cooke Fungi Britt., No.* 620.

On stems of *Arctium Lappa.* Kensington.

**Leotia circinans.** *Pers.*

Pileus fleshy, convex, at length undulate, margine involute, decurrent beneath in nerves with the stem, stem fistulose subpulverulent, asci ovate oblong; sporidia linear, equal in length to the ascus, somewhat curved when free.—*Pers. Ic. & Descr., p.* 16, *t.* 5, *f.* 5-7. *Fries Sys. Myc. ii.* 27. *Cudonia circinans, Fckl. Sym. Myc.*, 332. *Fckl. Ex.*, 1139.

In fir woods. Scotland.

Very distinct from *Leotia lubrica.* Colour pallid. Exhibited at the Fungus Show, South Kensington.

**Peziza (Sarcoscypha) Dalmeniensis.** *Cooke.*

Hemispherical, then expanded, bright yellow; cups fleshy, nearly plane, margin elevated, externally beset with long rigid brown hairs. Asci linear; sporidia elliptical, hyaline, enucleate, smooth.

On the ground in woods. Dalmeny, N. B. Sept.

At first sight greatly resembling *Peziza theleboloides*, but the external hairs are coloured, and five or six times as long; the sporidia are not more than half the size. [Plate xxxiv., fig. 121.]

**Peziza (Patellea) cerastiorum.** *Wallr.*

Gregarious, innato-sessile, minute, somewhat waxy, rather concave, marginate, testaceous, becoming pallid; asci clavate; sporidia oblong.—*Fries Sys. Myc. ii., p.* 153. *Desm. Ex., No.* 1068. *Cooke Fungi Britt., No.* 655. *Lib. Exs. No.* 28. *West & Wall, No.* 1081. *Kickx. Flor. Hand. i.*, 481.

On living chickweed. Chichester (*Dr. Paxton*).

**Peziza (Mollisia) filispora.** *Cooke.*

Scattered or subgregarious, soft; cups hemispherical, then flattened, externally horn-colour or tawny, brown when dry, and connivent; disc pallid dirty-white, slightly concave; asci cylindrical, clavate; sporidia filiform, straight or curved, triseptate; paraphyses filiform, simple.

On sheaths of grass.

Allied to *Peziza excelsior*, Karst.

**Hysterium (Lophodermium) sphærioides.** *A. & S.*

Innato-superficial, scattered, hemispherical, swollen, even,

shining, brownish-black; lips broad, convex, opening with a longitudinal straight fissure, more or less separating, at length broken or collapsing; asci cylindrical; sporidia filiform, hyaline.—*Alb. & Schw.*, *t.* 10, *f.* 3. *Duby Hyst.*, *p.* 44.

var. **Rhododendri.** Ces. = *Lophodermium Rhododendri*, Ces., *in Rabh. Fung. Eur.*, *No.* 458. *Rehm. Ascomy*, *No.* 126.

On leaves of *Rhododendron.* Shere (*Dr. E. Capron*).

**Melanconis modonia.** *Tul.*

Conidia nestling beneath the bark, at length erumpent, olive-brown, oblong-elliptic, 6-septate.

*Ascophore*—Perithecia globose or depressed, few together arranged in circles penetrating the bark, with rather short ostiola, and forming small pustules; asci cylindrical; sporidia biconical, uniseriate, hyaline.—*Cooke Fungi Britt.*, *No.* 681. *Tulasne Sel. Fung. Carp. ii.*, *p.* 141. *Fckl. Sym. Myc.*, *p.* 188. *Fckl. Exs.*, 2006. *Valsa biconica*, Curr. ("Handbook," No. 2491).

On dead twigs of *Castanea vesca.* Darenth. May.

Sporidia ·0014 × ·0003 in. ·036 × ·01 m.m.

**Cucurbitaria Euonymi.** *Cooke.*

Gregarious, subcuticular; perithecia subglobose, at length somewhat erumpent, often wholly concealed by the cuticle, except the small scarcely prominent ostiola; asci clavate, sessile; sporidia elongated, elliptical, constricted in the middle, multicellular, brown.—*Cooke Fungi Britt.*, *No.* 683.

On twigs of *Euonymus*, often with *Sphæria Laschii.* Mickleham. June.

Sporidia (·001 in.) ·025 m.m. long, resembling *Cucurbitaria spartii*, Not.

**Lophiostoma Hederæ.** *Fckl.*

Perithecia scattered, nestling beneath the epidermis, rarely free, of medium size, globoso-compressed, quite black; ostiola prominent, broadly compressed, semi-orbicular, somewhat crenulate; asci elongated, sessile; sporidia biseriate, fusiform, curved, 4 nucleate, then triseptate, hyaline.

On ivy twigs. Eastbourne (*C. J. Muller*).

Sporidia (·0007 × ·0015 in.) ·02 × ·004 m.m.

**Sphæria (Diaporthe) Euphorbiæ.** *Cooke.*

Forming irregular, determinate, elongated black patches; perithecia nestling beneath the blackened cuticle, which is slightly elevated by the ostiola; asci subcylindrical; sporidia subfusiform, quadrinucleate, hyaline.—*Cooke Fungi Britt.*, *No.* 674.

On dead stems of wood spurge. Darenth. May.

**Sphæria (Diaporthe) scobina.** *Nke.*

Stroma broadly effused; perithecia small, nestling in the inner bark, aggregated, subglobose or rather compressed; ostiola cylindrical, piercing the cuticle; asci narrowly fusiform, obtuse, quadrinucleate.—*Nke. Pyr. Germ.*, *p.* 293. *Fckl. Fungi Rhen.*, *No.* 2258. *Cooke Fungi Britt.*, *No.* 673.

On dead twigs of ash. Darenth. April.

Forming blackened irregular patches, seated beneath the cuticle, which is loosened, somewhat inflated, and at length fugacious. Sporidia (·0004 × ·00015 in.) ·011-·012 × ·004 m.m.

**Sphæria (Diaporthe) Laschii.** *Nke.*

Stroma broadly effused, innate, blackening the bark; perithecia nestling in the parenchyma of the bark, globose, attenuated into an abrupt neck; ostiola rather thick; asci clavate, sessile; sporidia fusiform, 4 nucleate, then 4 celled, hyaline.—*Nke. Pyr. Germ., p.* 292. *Fckl. Sym. Myc., p.* 208. *Cooke Fungi Britt., No.* 682.

On twigs of *Euonymus Europæus.* Mickleham.

Sporidia (·0003-·0005 × ·00011-·00015 in.) ·008-·014 × ·003-·004 m.m.

**Sphæria (Diaporthe) occulta.** *Nke.*

Perithecia covered by the thin black stroma, globose, black; ostiola exserted, sometimes much elongated, terete, acute; asci narrowly clavate; sporidia oblong or narrowly elliptical, attenuated at each end, quadrinucleate, hyaline.—*Nke. Pyr. Germ. p.* 266. *Fckl. Sym. Myc., p.* 210. *Fckl. Exs., No.* 622.

On scales of fir cones. Eastbourne (*C. J. Muller*).

**Sphæria cetrariicola.** *Nyl.*

Perithecia somewhat gregarious, minute, black, rather prominent. Asci octosporous, sporidia oblong, 1-3 septate, colourless. Paraphyses none. *Nyl. MSS. in litt.*

On *Cetraria Islandica.* Braemar (*Rev. J. M. Crombie*).

The specimen is deposited in the Herbarium of the British Museum.

**Sphæria Bryoniæ.** *Fckl.*

Perithecia nestling beneath the epidermis, at length nearly free, gregarious, very minute, globoso-depressed, papillate, black; asci oblong, attenuated at the base, obtuse; sporidia biseriate, oblong, or somewhat clavate, unequally bicellular, the upper cell large, the lower obconical, obtuse, hyaline.—*Fckl. Sym. Myc., p.* 112. *Fckl. Exs. No.* 2318.

On stems of *Bryonia dioica.* Shere, 1873. (*Dr. Capron.*)

Sporidia (·0007 in.), ·015-·017 m.m. long.

**Sphæria (Pleospora) culmorum.** *Cooke.*

Perithecia scattered, erumpent, globose, black, with a papillate ostiolum; asci clavate, sporidia elongated elliptical, triseptate, one cell transversely divided, pale brown.—*Cooke Fungi Britt., No.* 694.

On dead culms of grasses, straw, &c. Irstead.

The sporidia are much more characteristic and distinct than in many of the forms associated under *Pleospora.* This is different from *Sphæria infectoria*, Fckl. ("Handbook," No. 2693). Sporidia (·0012-·0015 in.) ·025-·035 m.m. long.

**Sphærella ditricha.** *Fr.*

Gregarious, seated on grey spots; perithecia hemispherical, small, black, mixed with a few erect hairs; asci fasciculate, oblong,

curved; sporidia oblong-obovate, unequally uniseptate, hyaline.—*Fries Sys. Myc.*, 515. *Fckl. Sym. Myc.*, *p.* 100. *Cooke Fungi Britt.*, *No.* 688. *Fckl Exs*, *No.* 568.

On dead leaves of birch. Darenth.

Sporidia (·0005 × ·00025 in.), ·014 × ·006 m.m.

**Sphærella hederæcola.** *Fr.*

Spots whitish, suborbicular or irregular, with a rather broad brown margin, perithecia gregarious, minute, globose, opaque, becoming black, at length naked; stylospores linear, slender, straight, in distinct perithecia; asci subcylindrical; sporidia minute, narrowly elliptical, uniseptate, hyaline.—*Fries Sys. Myc. ii.*, 528.

On green ivy leaves. Shere (*Dr. Capron*, 1873).

Sporidia (·0004 in.), ·01 m.m. long.

In habit precisely like *Septoria Hederæ*, of which it is undoubtedly the perfect condition.

**Sphærella atomus.** *Desm.*

Epiphyllous. Spots rufous, minute, somewhat orbicular; perithecia very minute, numerous, brown, innate, rather prominent, collapsing and umbilicate.—*Desm. Ann. des Sci. Nat.*, 1841, xv., *p.* 143. *Fckl. Fungi Rhen.*, *No.* 819.

On dead beech leaves. Darenth.

**Venturia glomerata.** *Cooke.*

Gregarious on discoloured spots, forming small tufts, hypophyllous; perithecia minute, black, erumpent, membranaceous, crowned about the ostiola with short rigid pointed black bristles; asci clustered, clavate; sporidia fusiform, uniseptate, hyaline, cells unequal.—*Cooke Fungi Britt.* (new series).

On languishing but living leaves of *Geranium dissectum*.

Eastbourne (*C. J. Muller*). Barnet & Mickleham (*M. C. C.*).

At first resembling to the naked eye *Stigmatea geranii*, Fr., but the distinct perithecia are recognizable under a lens.

ÆCIDIUM SCROPHULARIÆ. *D.C.*
in company with
UROMYCES CONCOMITANS. *Berk.*
D. Section of leaf × 50. F. Spore of Æcidium × 300.
H. Spores of *Uromyces* × 300.

X.300

# BRITISH FUNGI.

*By* M. C. Cooke. (*Continued from Vol. ii., p.* 166.)

The following are some of the additions recently made to the British Flora. Messrs. Berkeley and Broome have described several additional species in a recent number of the "Annals and Magazine of Natural History."

**Peziza (Macropodes) Ciborium.** *Fr.*

Cinnamon, cups campanulate, subpruinose, stem even, fibrillose, rooting at the base. Sporidia elliptical.—*Fries. Sys. Myc. ii.*, 59. *B. & Br., Ann. N.H., No.* 1479.

On the ground.

This is the largest form indicated by Fries, and not that figured in "Flora Danica," *t.* 1078, *fig.* 1. "There are a few brown myceloid fibres at the base, while the earth above is filled with scattered patches of spawn." Sporidia ·001 × ·0004-·0005 in. *B. & Br.* ·025 × ·012 m.m.

**Peziza (Cupulares) tectoria.** *Cooke.*

Sessile, or very shortly stipitate, cups at first globose, then expanded, whitish, furfuraceous, at length smooth, disc plane, subumbilicate, pale ochraceous, margin uneven, splitting; paraphyses linear, hyaline, asci cylindrical. Sporidia uniseriate, elliptical.

On damp plaster wall. Shrewsbury (W. Phillips).

At first appearing as a small white furfuraceous ball, seated on a white mycelium $\frac{1}{4}$ in. across; when old becoming very irregular in form, $1\frac{3}{4}$ in. across; margin rather thick and jagged. The tips of the asci are clear blue with iodine. Sporidia ·018 × ·009 m.m. to ·02 × ·01 m.m.

This species was at first confounded with *P. viridaria*, B. & Br., from which it differs in colour, larger size, uncoloured paraphyses, and different sporidia. The sporidia in *P. viridaria* are ·015 × ·008 m.m.

**Peziza (Cupulares) sepiatra.** *Cooke.*

Sessile, or very shortly stipitate. Cups at first hemispherical, soon expanded and nearly plane, umber-brown, slightly furfuraceous, margin narrow, scarcely elevated; disc plane, sometimes umbilicate, darker, nearly pitch-brown; asci cylindrical. Sporidia elliptic, paraphyses clavate at the tips. (Fig. 135.)

On charcoal, Epping. On the ground, Shrewsbury (W. Phillips).

Not more than $\frac{1}{2}$ an inch broad, often less, scarcely distinguished at the first from the charcoal on which it grows, rather fleshy and brittle, gregarious. Sporidia ·02-·022 × ·011 m.m., perhaps approaching a small form of *P. repanda*, but distinct, the sporidia are larger. The large cells of the cup in *P. repanda* have been noticed by some authors from their extraordinary size, about ·09 × ·06 m.m., whereas the largest in *P. sepiatra* are about ·03 m.m. diam.

**Peziza (Humaria) vivida.** *Nyl.*

Solitary or gregarious, fleshy, stipitate, cups at first clavate, then open and cupshaped, disc concave, red, becoming somewhat brownish; externally paler and fibrillose, stem thick, expanding into the cup; asci clavate. Sporidia elliptical, with 1-2 nuclei, epispore delicately granulated.—*Nylander in Flora* (1865) *p.* 467. *Rabh. Myc. Eur. iii., p.* 7, *t.* 4, *fig.* 3. *Peziza Polytrichi. Rabh. Herb. Myc. ii. No.* 310.

Amongst moss. Wiltshire (C. E. B). Scotland (in herb. Edin.)

Cups 2-4 lines broad and high. Sporidia ·025 × ·012 m.m. This is one of the species which has been confounded with *P. polytrichi* and *P. leucoloma*. In the Edinburgh Herbarium it is referred to the latter by Dr. Mougeot. The fibrillose coating of the cup and the large granular sporidia are sufficient to distinguish it from any of its immediate allies. It would appear that the true *P. Polytrichi*, Schum., is a smaller plant, and has smooth subglobose sporidia. Most probably the *Peziza leucoloma* of Rabenhurst's "Mycologia," and of Nylander and Karsten are also *P. Polytrichi*, with sporidia ·011-·013 m.m. diameter. The *Peziza Polytrichi* of Karsten and also of Nylander is *Peziza Crouani*, C. (*Ascobolus Crouani* of the "Handbook"), with reticulated globose sporidia. The specimens published by Fuckel as *P. leucoloma*, appear to be identical with those which Messrs. Berkeley and Broome had in view as that species (Ann. Nat. Hist., No. 1156*), with elliptical nucleated sporidia, ·02 × ·01 m.m. The figure in "Grevillea" (*iii. fig.* 73) is from Fuckel's plant. In order to render the character of the fruit in the three species clear and distinct, we will summarise our conclusions, thus:—

*P. vivida*, Nyl. Sporidia elliptic, granulated, ·02 × ·012 m.m.
*P. leucoloma*, P. Sporidia elliptic, smooth, ·02 × ·01 m.m.
*P. Polytrichi*, Sch. Sporidia globose, smooth, ·011—·013 m.m.

**Peziza (Humaria) exidiiformis.** *B. & Br.*

Orbicular, lurid purple; margin elevated, inflexed, stem incrassated upwards, hymenium cribrose. Sporidia broadly elliptical, binucleate, paraphyses slightly clavate.—*B. & Br., Ann. N.H., No.* 1480.

On silver sand, and rotten wood.

Two lines or more broad. Contracting very much when dry. Sporidia (·0007 × ·0004 in.) ·017 × ·01 m.m.

**Peziza (Humaria) fusispora.** *B.*

Gregarious, here and there crowded, orange-yellow, hemispherical, slightly concave, or quite flat, with a delicate membranous edge, obscurely tomentose, fixed to the soil by a little down. Asci cylindrical, obtuse, sporidia elliptic, attenuated slightly at either end, and binucleate. Berk. in "Hook. Journ.," 1846.—*B. & Br., Ann. N. Hist., No.* 1481. ("Grevillea," *iii., fig.* 84.)

On heathy ground.

A very pretty species, varying from nearly white to orange or blood-red, 1-2 lines. Sporidia (·001-·002 ·0005 in.) ·025-·03 × ·012 m.m.

**Peziza (Dasyscypha) subtilissima.** *Cooke.*

Externally scarce distinguishable from *P. calycina*, Sch. Asci subclavate; sporidia cylindrical, curved, minute, hyaline.—*Peziza calycina*, Fries. S. S. 360.

On bark of firs. Scotland (A. Jerdon).

Sporidia ·009 m.m. long.

This species has been confounded with *Peziza calycina*, from which it differs completely in fruit. The specimens published in "Fungi Britannici," "Rehm's Ascomyceten," and "Fuckel's Fungi Rhenani," have sporidia that are oblong, ·02-·023 × ·009-·001 m.m., and this is generally recognised as *P. calycina*. Having occasion to examine specimens received from the late A. Jerdon, it was found that in these the fruit was quite different, as described above, which led to the examination of other specimens; amongst these the specimens published by Fries in his Scleromycetes Suecicæ, and specimens from Dr. Mougeot; these all proved to be the present species, which is evidently the species described as *P. calycina*, Sch., by Karsten and Nylander; the other form, which is the *P. calycina* of other European mycologists, is wholly unnoticed, and perhaps does not occur in Finland, or has been overlooked, as this has been with us. The question at once arises as to which is the true *P. calycina*, Schum. The answer will be simply this: that at the time Schumacher described his species, and when Fries and Mougeot (1824) distributed specimens, the fruit was not habitually submitted to examination, and as the two species are so much alike that they cannot be distinguished from each other externally, it is extremely probable that both were accepted indiscriminately as *P. calycina*.

**Peziza (Dasyscypha) calycina var. Trevelyani.**

This is a singular form of *P. calycina*, which cannot claim to be regarded as a distinct species on the faith of a single specimen, but which may hereafter be proved to be distinct. It was found on larch, and the fruit differs from the typical form in the large size of the sporidia, which are very variable, and reach as much as ·03-·035 m.m. in length, or nearly double that of the typical form. The endochrome is also often bipartite, so that the sporidia have the appearance of being uniseptate. In the plates which accompany this number, the sporidia are represented × about 400.

Fig. 166.—*Peziza calycina*, Schum.

Fig. 166b.—*P. calycina* var. *Trevelyani.*

Fig. 167.—*P. subtilissima*, Cooke.

The following species are also vere similar externally to *P. calycina*, of which figures are given:—*P. chrysophthalma*, P. (fig.

168), *P. Agassizii*, B. & C. (fig. 169), *P. illota*, B. & Br. (fig. 170), *P. fusco sanguinea*, Rehm. (fig. 179), *P. simillima*, B. & Br. (fig. 198), to which might be added *P. lachnoderma*, B., and *P. rhaphidophora*, B. & Br., figures of which will appear in succeeding plates.

**Peziza (Dasyscypha) brunneola.** *Desm.*

Amphigenous, stipitate, villous, small, brown, somewhat scattered; cups subglobose, then plane, marginate; disc whitish, growing pallid; stem cylindrical; sporidia very minute, spermatioid.—*Desm. Ann. Sci. Nat.* xvii. (1842) p. 96. *Desm. exs.* i. 1156, ii. 656. *Phillips exs. No.* 28.

On oak leaves. (W. Phillips.)

Asci ·04 × ·005 m.m. (Grev. iii., fig. 184.)

**Peziza (Mollisia) rubella.** *Pers.*

Gregarious, minute, sessile, between soft and waxy, becoming somewhat plane, smooth, flesh-red; margin sublaciniate; sporidia minute, cylindrical.—*Pers. Syn., p.* 635. *B. & Br. Ann. N.H., No.* 1484.

On decayed wood with *P. vinosa*.

Cups 1-2 lines broad; sporidia ·006 × ·002 m.m.

**Peziza (Mollisia) Stevensoni.** *B. & Br.*

Minute, subglobose, sugar-coloured, externally minutely granular; stem very short, incrassated upwards; sporidia minute, subcymbæform.—*B. & Br., Ann. Nat. Hist., No.* 1485.

On decorticated wood. Glamis.

Sporidia (·0005 in. long) ·0127 m.m. This is accompanied by white creeping threads, which give off erect branches bearing obovate spores ·001 long. Probably a conidiiferous state.—*B. & Br.*

**Helotium melleum.** *B. & Br.*

Pallid honey colour; stem short, cylindrical; cups plane, flexuose; margin elevated, inflexed; asci elongated, lanceolate; sporidia biseriate, fusiform, curved on one side, multinucleate.—*B. & Br., Ann. N.H., No.* 1457.

On rotten wood.

About a line broad, stem half as much high, sporidia (·0012 in.) ·03 m.m. long. Allied to *H. luteolum*.

**Helotium sublateritium.** *B. & Br.*

Pallid, brick-red; stem short, cylindrical, delicately whitish-villose, becoming smooth; cups plane, veined beneath; margin elevated; asci linear; sporidia uniseriate, shortly fusiform, binucleate.—*B. & Br., Ann. Nat. Hist., No.* 1488.

On stems of herbaceous plants. Glamis.

Sporidia (·001 × ·0002 in.) ·025 × ·005 m.m.

**Psilopesia myrotheciodes.** *B. & Br.*

Suborbicular; margin laciniate, tomentose, pallid yellow; disc

greenish-black ; asci linear ; sporidia elliptic ; margin pellucid.—*B. & Br., Ann. N.H., No.* 1489, *t.* 2, *f.* 5.

On *Prunus padus.* New Pitsligo.

Sporidia (·0009 in.) ·023 m.m. long. One of the most curious circumstances about this species is that some of the asci contain a very delicate spiral thread or line.—*B. & Br.*

**Patellaria Fergussoni.** *B. & Br.*

Stem short, incrassated upward ; cups plane, externally brown, granulose ; hymenium plane or pulvinate, yellow ; asci elongated ; sporidia filiform, paraphyses with a globose head.—*B. & Br., Ann, N.H., No.* 1490, *t.* 2, *f.* 6.

On *Prunus padus.* New Pitsligo.

Sporidia (·009 in.) ·22 m.m. long.

**Ascobolus consociatus.** *B. & Br.*

Cups externally rugose, granulated, pallid, yellow or whitish ; asci clavate, short ; paraphyses linear ; sporidia biseriate, broadly fusiform.—*B. & Br., Ann. N.H., No.* 1491, *t.* 2, *fig.* 7.

On the remains of *Sphæria cupulifera.* April.

Cups ·003-·01 inch diam.

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## HEPATICÆ OF BORNEO.*

Professor Notaris has recently described the species of Hepaticæ found by Dr. Beccari at Sarawak, in the "Memoirs of the Royal Academy of Sciences at Turin," a reprint of which in a separate form has just been issued, fully illustrated. The number of species enumerated is 51, of which about one half are new. Most of the old species occur in Java and Sumatra, and two or three extend to Ceylon. One new genus is characterised under the name of *Diploscyphus*, to which one species is referred. From the preface we learn that Dr. Sande Lacoste enumerated 45 species of Bornean Hepaticæ in his "Jungermanniæ of the Indian Archipelago," which was published in 1864, of which not more than four occur in the present collection, which raises the number to 92. The twenty quarto plates add considerably to the value of the work, for though names may change, and the limits of species vary in acceptation in the course of a few generations, faithful figures will always prove valuable, even long after the letterpress which accompanies them ceases to be of much service. This is the case in all branches of Natural History, and it is especially so in Cryptogamic Botany. It is on account of their plates that Schœffer, Batsch, and Nees von Esenbeck are known to the present generation of mycologists as some of the present will be known to the future.

* Epatiche di Borneo, raccolte dal Dr. O. Beccari nel ragiato di Sarawak durante gli anni 1865 7 descritte dal Dr. G. de Notaris. Torino, 1874.

## NEW AND RARE BRITISH FUNGI.

*By* Wm. Phillips and Charles B. Plowright.

(*Continued from* Vol. ii., *p.* 189, *with plate* 42.)

14. **Diplodia sapinea.** Fckl. Symb. Mycol., *p.* 393. Fr. System. Myc. ii., *p.* 491. sub Sphæria.

The septa in the spores are frequently deficient. On bark of *Pinus sylvestris*, Terrington, St. Clements.

15. **Diplodia viticola.** *Desm.* Ann. Sc. Nat., 1838. Fckl. Symb. Mycol., *p.* 395.

On bark of *Vitis vinifera*, North Wootton.

16. **Uredo alchemillæ.** Pers. Synop. *p.* 215. Fckl. Symb. Mycol. *p.* 65.

On *Alchemilla vulgaris*. Specimens of this and of its *Uromyces* form, *Trachyspora alchemillæ*, Fckl., have been found by Mr. T. Brittain, in Derbyshire.

17. **Cronartium Pæoniæ.** *Tul.* Fckl. Symb. Mycol., *p.* 66.

*Sphæria flaccida*, A. & S. On living pæony leaves. St. Leonards-on-Sea. Miss Jelly. Agreeing exactly with specimens received from Dr. P. Magnus.

17. **Torula ulmicola.** *Rbh.* Handb., *p.* 35.

On elm bark, Rev. J. Keith, Forres, N. B., June, 1874.

18. **Torula profusa.** *Wallr.* Fuckel Symb. Mycol., *p.* 88.

On oak bark, Rev. J. Keith, Forres. Not in an ascigerous condition.

19. **Periconia Phillipsii.** B. & Br. in Ann. Nat. Hist., Jan., 1875.

This minute species was found growing on the perpendicular surface of damp earth in the hollows left by the falling away of stones, in company with *Thelocarpon superellum*, Nyl., a Lichen new to our Flora. The spores are spherical, verrucose, and fuscous, ·0003 in. diam.

Trefriw, North Wales, May, 1874.

*Plate* 42, *fig.* 1. *a.* nat. size of plant ; *b.* magnified ; *c.* spores.

20. **Protomyces sagittariæ.** Fckl. Symb. Mycol., *p.* 75.

On *Sagittaria sagittifolia*. St. Leonards-on-Sea. Miss Jelly.

21. **Protomyces macrosporus.** *Ung.* Exanth., *p.* 843.

On *Œgopodium podagraria*. Shrewsbury.

* **Mitrula paludosa.** *Fr.* Phillips. El. Brit., No. 2.

This species abounds in boggy water courses near Capel Curig and Betws-y-Coed, North Wales.

* **Vibrissea truncorum.** *Fr.* Phillips. El. Brit., No. 4.

This is found in similar places to the preceding species, but much rarer. Those published in *El. Brit.* were on dead stems of birch lying in water. It is curious to observe the effect of change of temperature on this plant, causing the filiform sporidia to dart out suddenly from the hymenium like threads of spun glass.

* **Peziza succosa.** *B.* Phillips. El. Brit., No. 10.

We found this well-marked species when with the Woolhope Field Club at Downton, near Ludlow, October, 1874. The sporidia

in mature specimens are decidedly echinulate. The summits of the asci become blue with iodine.

* **Peziza hirta.** *Sch.* Phillips. El. Brit., No. 19.

We mention this for the purpose of indicating the curious and unusual host chosen by the specimens published in *El. Brit.*, viz., on decaying pilei of *Polyporus squamosus*, Fr.

22. **Peziza (Dasyscyphæ) brunneola.** *Desm.* Pl. Crypt 1, No. 1561, 2, No. 656. Phillips. El. Britt., No. 28.

Amphigenous, stipitate, villous, small, brown, somewhat scattered; young cups subglobose, mature ones plane, margined; disc pallid white; stem short, glabrous, ivory-like; asci cylindrical, obtuse; sporidia oblong.

On dry oak and Spanish chestnut leaves. Trefriw, North Wales, May, 1874.

Desmazières points out (Ann. Sc. Nat. 1841, V. xvii., *p.* 96), a remarkable character in the paraphyses, viz., that they are much longer than the asci, perfectly straight, fusiform, pointed, and as broad as the asci. We have represented these as they appear to us (*fig.* 2. *d.*) rising above the summits of the asci, a character seen much more markedly in *Desmazierella acicola*, Libt. The faintly-fuscous hairs clothing the cups are septate, the obtuse or pear-shaped summits having a mass of hyaline cells on them, which easily fall away. No blue reaction with iodine.

*P.* 42, *fig* 2. *a.* nat. size of plant; *b.* the same magnified; *c.* the septate hairs with enlarged heads, clothed with hyaline cells; *d.* a portion of the hymenium; *e.* paraphyses; *f.* an ascus; *g.* sporidia; all much magnified.

23. **Peziza (Dasyscyphæ) trichodea.** *n. s.**

Congregated or scattered; stem short; cup at first globose, then cupulate; clothed externally with long rigid hemp-like hairs; disc pallid white; sporidia biseriate, oblong, binucleate.

On old decayed leaves of *Pinus sylvestris*. Trefriw, North Wales, May, 1874.

This species was found sparingly in one place only—a damp, shady spot, where the pine leaves had become black from decay. The cups when dry are closed, the long hairs that clothe them inclining together over the mouth, and even when expanded by moisture the hairs still incline inwards, forming a fringe round the edge. The colour of the whole plant is nearly uniform, and the hairs resemble in colour and texture manufactured hemp. The asci are ·001 in. long, the sporidia ·0002 in. long. Iodine gives no blue reaction.

*P.* 42, *fig.* 4. *a.* nat. size of plant; *b.* the same magnified; *c.* hairs of the cup; *d.* ascus and paraphyses; *e.* sporidia; all highly magnified.

* After searching all the sources of information open to us in vain for a description of the species, and distributing specimens to some of our leading English mycologists with a similar result, we have ventured to publish it as new.

24. **Saccobolus violascens.** *Boud.* Mem. Sur. les Ascob. *t.* 8. *f.* 19. Phillips. El. Brit., No. 48.

Scattered or aggregate, minute, 1-2 mill. broad, rotundate, or more or less flexuose, glabrous, shining, subgelatinous, cinerio-violet; disc convex; apices of paraphyses thickened, pear-shaped, becoming violet. Boud.

On cow-dung, Norfolk, 1873.

25. **Desmazierlla aciccola.** *Libt.* Pl. Crypt. Ardn., No. 24. Ann. Sc. Nat., 1829, *p.* 82, *c.i.* Phillips, El. Brit., No. 45.

Peziza-form, nearly plane, sessile, about two lines broad, coated externally with a fuscous, byssoid, compact tomentum; hairy, with long, patent, crowded, nearly black hairs; disc olivaceo-cinereous.

On dead leaves of *Pinus sylvestris*.

Wrekin, Shropshire, Jan., 1872. Trefriw, North Wales, May, 1874.

This appears at first as a minute, hairy *Chetomium*-like body, nearly black, afterwards expanding into a sublentiform disc. The brown hairs of the hymenium being prolongations of the paraphyses, give this plant a striking character. The sporidia are hyaline, binucleate, ·0006 in. long, ·0003 in. broad.

No blue reaction with iodine.

*Plate* 42, *fig.* 3. *a.* nat. size of plant; *b.* section enlarged; *c.* a hair magnified; *d.* a bundle of paraphyses, the summits changed into hairs; *e.* asci; *f.* sporidia, all highly magnified.

* **Torrubia myrmecophila.** *Tul.*

A single specimen of this rare *Sphæria* was found in a wood at Trefriw, North Wales, May, 1874.

26. **Nectria mammoidea.** n. sp.

Sub-cæspitose; perithecia medium sized, globose, minutely furfuraceous, brick-red; ostiola papillate, persistently darker than the perithecia; sporidia elliptical, uniseptate, somewhat acuminate, rather irregular in size and form, ·001 in. × ·0004 in.

*Sphær. Brit.*, Cent. *ii.* (inedit.).

On furze stumps, North Wootton. On birch bark, Ercall. W.P.

*Plate* 42, *fig.* 5. *a.* perithecia enlarged; *b.* sporidia.

27. **Dothidea angelicæ** *Fr.* System. Mycol. II., p. 561.

On *Angelica*. Dr. Buchanan White, 1874.

* **Dothidea Johnsonii.** *B. & Br.*

Spores uniseptate, unequal, ·0008 in. long.

28. **Diaporthe samaricola.** n. sp.

Perithecia minute, immersed, covered by a circumscribed thin black stroma, variable in size and outline; ostiola minute, prominent; sporidia biseriate, colourless, quadrinucleate, somewhat acuminate, ·0007 in. × ·002 in.; asci ·003 in. × ·0004 in.

On the samari of ash, Terrington, Jan., 1875.

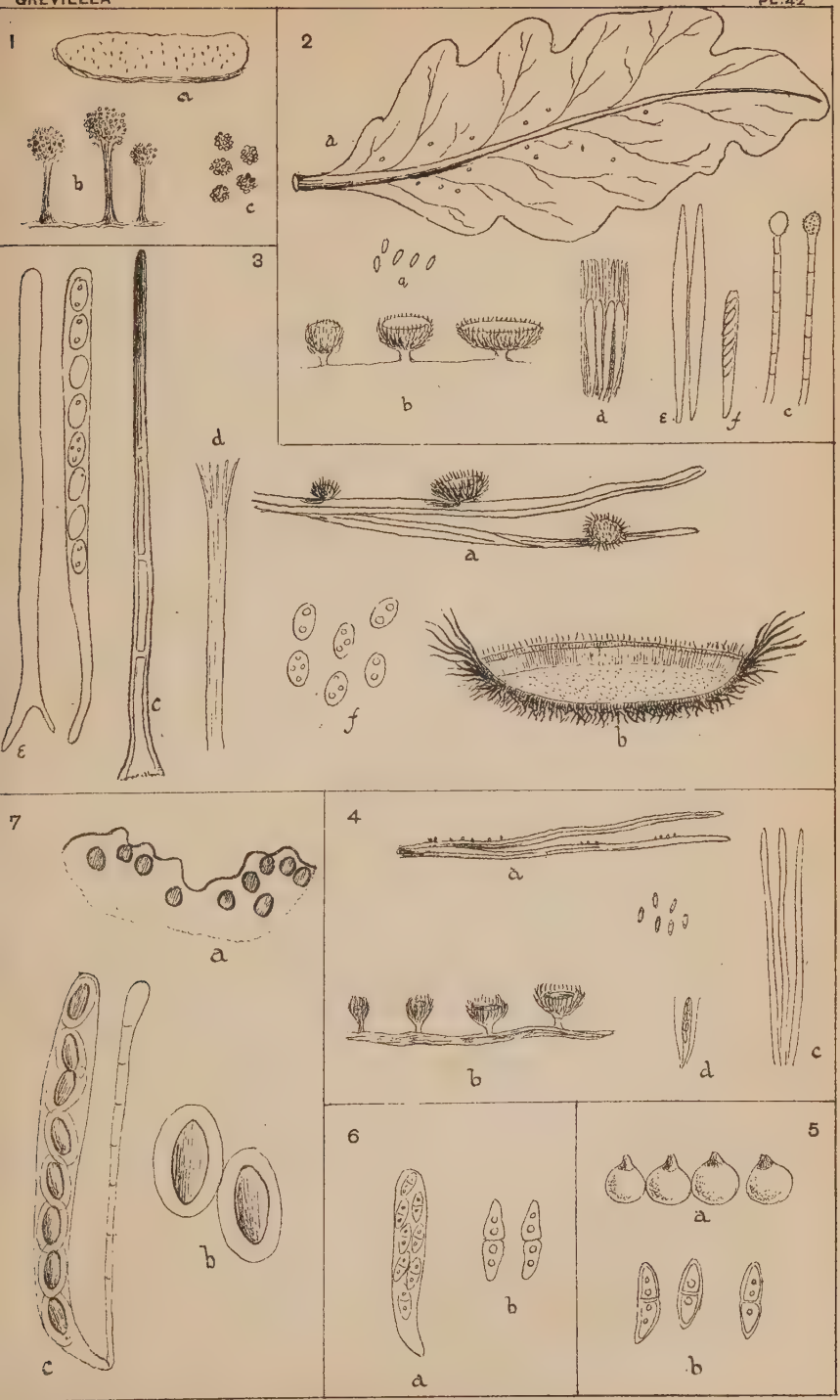
*Plate* 42, *fig.* 6. *a.* ascus; *b.* sporidia.

29. **Diaporthe spina.** Fckl. Symb. Mycol., *p.* 210.

On ozier, North Wootton, 1874.

30. **Sphæria (Didymosphæria) applanata** (Niessl. in litt.) n. s.

On *Rubus Idæus*, Shrewsbury, 1874.




BRITISH FUNGI

# REVISION OF GEOGLOSSUM.

*By* M. C. Cooke

The species of *Geoglossum* enumerated in the "Handbook," at pp. 662, are imperfectly described in so far as the fruit is concerned. The following revision of these characters will therefore be noted by those who are in possession of that work.

**1856. Geoglossum viride.** *P.*—Asci cylindrico clavate; sporidia narrowly elliptical, or somewhat lanceolate, obtuse at the ends, hyaline, simple (·03 × ·01 m.m.); paraphyses linear, scarcely thickened at the tips.

**1957. Geoglossum olivaceum.** *P.*—Asci cylindrico-clavate; sporidia narrowly elliptical, obtuse at the ends, hyaline, simple (·025 × ·008 m.m.); paraphyses linear, scarcely incrassated.

**1958. Geoglossum glutinosum.** *P.*—Asci cylindrico-clavate; sporidia cylindrical, straight or curved, 3-septate, brown (·08 m.m. long); paraphyses filiform, with pyriform tips.

**1959. Geoglossum viscosum.** *P.*—Asci cylindrico-clavate; sporidia cylindrical, straight or slightly curved, 3-septate, brown (·09-·01 m.m. long); paraphyses filiform, globose at the tips, not septate.

**1960. Geoglossum glabrum.** *P.*—Asci cylindrico-clavate; sporidia cylindrical, straight or slightly curved, 7-septate, brown (·085-·09 m.m. long); paraphyses filiform, thickened at the tips, septate, the four ultimate cells oval, concatenate, moniliform.

**1961. Geoglossum hirsutum.** *P.*—Asci cylindrico-clavate; sporidia fasciculate, cylindrical, slightly curved, 15-septate, brown (0·15 m.m. long); paraphyses septate, slightly incrassated at the tips, curved, or circinate.

**1962. Geoglossum difforme.** *Fr.*—Asci cylindrico-clavate; sporidia cylindrical, straight or slightly curved, 7-septate, brown (0·11 m.m. long); paraphyses filiform, very long, septate, flexuous and contorted at the tips.

A species of *Geoglossum* allied to *G. glutinosum* occurs in the United States, the sporidia of which are 15-septate. Another hirsute species has at length been found in Australia (*G. Walteri*), with sporidia shorter than in *G. hirsutum*, and 7-septate. A singular variety of *Geoglossum hirsutum* occurs in the United States which does not exceed an inch in height; the clubs, and indeed the whole plant, is nearly smooth, the bristles which spring from the base of the hymenium are slender, and scarcely longer than the paraphyses; the paraphyses are the same as in *G. hirsutum*, of which it is probably a variety.

It is hoped that coloured figures, with analyses, will be published shortly of all known species of *Geoglossum*, as part of an Atlas

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## PHRAGMIDIUM.

*(Plate 45.)*

Figures have been executed of several species of *Phragmidium*, which will be found on plate 45. These are drawn by camera lucida to the same scale as the figures of *Peziza*, about 400 diam., but the accurate scale will be found at the bottom of plate 28, by means of which the figures may be measured.

**Xenodochus carbonarius.** *Schl.*—Cooke "Handbook," No. 1455. (Plate 45, fig. 1.) Fungi Britt., ii., No. 97.
On living burnet leaves.

**Phragmidium bulbosum.** *Schl.*—Cooke "Handbook," No. 1458. Fungi Britt., ii., No. 99. *P. incrassatum*, Jh. Rabh., F. E., 1181. Thümen, F. Aust., No. 227. *P. asperum*, Rabh., F. E., No. 476. (Plate 45, fig. 2.)
On living bramble leaves.

**Phragmidium mucronatum.** *Lk.*— Cooke "Handbook," No. 1456. "Fungi Britannici," ii., No. 98 (fig. 3.)
On living rose leaves.

**Phragmidium mucronatum.** Var. *rubi.*—Cooke "Fungi Britannici," i., No. 18 (fig. 8.)
On living leaves of *Rubus cæsius*.

**Phragmidium speciosum.**— Fr. Sys. Myc., iii., 496. Rav. "Fungi, Car.," iii., 90.
On rose branches (United States).

**Phragmidium obtusum.** *Fr.*—Cooke "Handbook," No. 1460, (fig. 5.) Fungi Britt., ii., No. 100.
On living leaves of *Potentilla*.

**Phragmidium acuminatum.** *Fr.*—Cooke "Handbook," No. 1487 (fig. 6.).
On living burnet leaves.

**Phragmidium bullatum.** *West.*—"Grevillea," iii., p. 65. (fig. 7.)
On twigs of sweet briar, &c.

**Phragmidium gracile.** *Grev.*—Cooke "Handbook," No. 1459. *P. effusum.* Fckl. Exs., No. 316. (fig. 9.)
On living raspberry leaves.

All the above are British, with the exception of *Phragmidium speciosum*, Fr., which is North American. *Phragmidium granulatum*, Rabh., on leaves of *Potentilla alba*, would seem to be a good species, although most of the continental names are merely synonyms of one or other of the species which we have figured.

We have just received from Professor Passerini a species of *Triphragmium* on *Spiræa filipendula* which differs from *Triphragmium Ulmariæ* in the spores having a smooth and more delicate epispore. It should, perhaps, be regarded as a distinct species.

# BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from page* 123.)

The species described or enumerated by Messrs. Phillips and Plowright (see page 124) are not again referred to. About fifty species of Hymenomycetes remain to be included in a subsequent number.

**Leptostroma glechomatis.** *B. & Br. Ann. N.H., No.* 1449.
Spots tawny; perithecia irregular, minute, epiphyllous; spores minute, oblong.
On leaves of ground ivy. Scotland.

**Leptothyrium pictum.** *B. & Br. Ann. N.H., No.* 1450.
Spots rufous, here and there paler, when fertile margined with brown; perithecia shining, ocellate; spores subcymbæform, curved.
On leaves of *Lonicera.* Glamis.

**Septoria Hyperici.** *Desm. Ann. Sci. Nat.*, 1842, *xvii., p.* 110.
Epiphyllous; spots suborbicular, oblong, or indeterminate, rufous-brown, with a yellowish margin; perithecia minute, innate, rather prominent; mouth orbicular, broadly open; tendrils delicate, pale red; spores linear, somewhat curved with 8-16 nuclei.—*Desm. Exs. i.*, 1178, *ii.*, 678. *Berk. & Br. Ann. N.H., No.* 1460.
On leaves of *Hypericum.* Glamis (Rev. J. Stevenson).
Spores (·002 in.) ·05 m.m. long.

**Septoria Stachydis.** *Desm. Ann. Sci. Nat.*, 1847, *viii., p.* 19.
Spots amphigenous, subolivaceous, then pallid brown or bleached, irregular, girt by the veins, scattered or confluent; perithecia epiphyllous, very minute, brownish-black, pierced; spores linear, delicate, curved, or flexuous.—*Berk. & Br. Ann. N.H., No.* 1461.
On leaves of *Stachys sylvatica.* Glamis (Rev. J. Stevenson). Shere (Dr. Capron, 1864).
Spores slender, threadlike (·001-·0015 in.) ·025-·03 m.m.

**Septoria Veronicæ.** *Desm. Ann. Sci. Nat.* 1849, *xi.*, 348.
Spots amphigenous, small, roundish, brown or grey, then bleached and whitish, with an umber margin; perithecia epigenous, globose, brown becoming blackish; spores elongated, very thin, straight or curved.—*Desm. Exs. i.*, 1710. *Phyllosticta Veronicæ, Cooke Fungi Britt. i.*, 615.
On living leaves of *Veronica.* Shere.

**Phoma Vitis.** *Bon.*
Minute, punctiform, scattered; perithecia globose, black, piercing the cuticle with the minute ostiola; spores narrowly elliptical, hyaline.—*Cooke Fungi Britt., No.* 618, *ii. No.* 14, *with fig.*
On vine twigs. King's Lynn (C. B. Plowright).
Spores ·01-·012 m.m. long.

**Phoma projecta.** *Cooke.*

Gregarious, erumpent; perithecia globose, black, piercing the blackened cuticle with the prominent ostiola; spores narrowly elliptical with 1-3 nuclei.—*Fungi Britannici, ii.*, 20, *with fig.*

On stems of *Umbelliferæ*. Mickleham. June.

Spores ·015 m.m. long.

**Phoma Pinastri.** *Lev. Ann. Sci. Nat.*, 1846., *v. p.* 282.

Perithecia gregarious, innate, globose, black, covered by the lacerated epidermis, pierced at the apex. Spores oblong, brown.—*Cooke Fungi Britt., ii., No.* 16.

On scales of fir cones. Eastbourne (C. J. Muller).

Spores ·01 × ·006-·007 m.m.

**Hendersonia exigua.** *Cooke.*

Perithecia scattered, minute, punctiform, membranceous, blackish brown, becoming flattened. Spores small, elliptic, bi-septate, pale brown.—*Fungi Britannici, ii.* 24, *with fig.*

On smooth bark.

Perithecia not more than ·085 m.m. in diameter. Spores .01-·012 m.m. long.

**Excipula congregata.** *Cooke.*

Gregarious, forming dark patches on the stems. Receptacle immersed, furnished with stiff erect black bristles, which burst through the cuticle. Spores linear, curved, obtuse.

On dead stems of wood spurge. Darenth.

**Melanconium elevatum.** *Ca. Icon. iii.* 22, *fig.* 60.

Stroma broad, white, rarely obliterated, spore-mass very black, diffluent. Spores ovoid or oblong, brown.—*Berk. & Br. Ann. N. H. No.* 1462.

On oak. Langridge. Dec.

Spores (·0005 in.) ·0127 m.m. long.

**Pestalozzia funerea.** *Desm. Ann. Sci. Nat.*, 1843., *xix., p.* 335. *Cooke Handbook, No.* 1402. *Berk. & Br. Ann. N. H., No.* 1463.

On *Cupressus macrocarpa.* Hatton.

**Torula splendens.** *Cooke. (Pl.* 48, *fig.* 1.)

Effused in dense black velvety patches. Flocci attenuated upwards, sometimes with one or two patent branches, joints subglobose, compressed, not readily separating, dark brown.

On bark. Forres (Rev. J. Keith).

A truly splendid species, the flocci have no tendency to break up, and are fully ·25 m.m. long, the joints are ·01 m.m. diam. towards the base, but smaller above. We know of no described species to which it can be referred.

**Helicomyces tubulosus.** *Riess. (Pl.* 48, *fig.* 3.)

White, pellucid, farinaceous. Spores concatenate in a long spiral thread, with a very short stem, joints subquadrate, nucleate. —*Riess in Bot Zeit.*, 1853, *fig.* 11-13.

On rotten wood. Hereford (J. G. Morris).

This curious fungus we have referred to the above with some hesitation, never having seen a specimen of the plant described by Riess, with the description of which the Hereford specimens appear to agree in many points; the spore threads are decidedly coloured brownish, joints about ·01 m.m. dia.

**Puccinia silenes.** *Rabh. Fung. Eur., No.* 1783.

Spots yellowish; sori roundish or oblong, scattered or aggregated; pseudospores elongated, elliptical, slightly constricted at the septum, on short pedicels, brown; stylospores globose, smooth. —*Puccinia Lychnidearum, Fckl.*

On leaves of *Silene inflata.* Basingstoke (R. S. Hill).

This is quite distinct from other species on Caryophyllaceous plants, the pseudospores being of a different character, each cell rounded above, or sometimes somewhat obtusely triangular, ·03-·032 × ·018 m.m.; whilst the stylospores (Uredo form) are globose, smooth, and about ·02 m.m. diam.

**Puccinia Andersoni.** *B. & Br. Ann. N.H., No.* 1464.

Spots epiphyllous, orbicular, surrounded by a brown border; sori hypophyllous, minute, crowded, almost concealed by the pubescence of the leaf; pseudospores oblong, constricted in the centre, obtusely apiculate.

On leaves of *Cnicus heterophyllus.* Glen Ogle. June.

Pseudospores very like those of *P. discoidearum*, as figured by Corda.

**Puccinia Fergussoni.** *B. & Br. Ann. N.H., No.* 1465.

Spots pallid; sori minute, crowded in orbicular clusters; pseudospores oblong, obtusely apiculate. Pl. 49, fig. 10c.

On leaves of *Viola palustris.* New Pitsligo (Rev. J. Fergusson).

Very different from *P. violarum*, not only in the minute crowded sori, but in the elongated spores.—*B. & Br.* So closely resembling *Puccinia Asari* that unboubtedly the specimens published in "Fungi Britannici," No. 110, belong to this species.

This is one of at least four good species of *Puccinia* that occur on leaves of *Viola;* the other British species is *P. Violarum*, found also in the United States. Pl. 49, fig. 10 a. The pseudospores are about ·02-·03 × ·013- 016 m.m. Another species occurs on *Viola hastata,** in North America, with pseudospores ·035-·04 × ·02-·025 m.m., a very considerable difference in size. The fourth species is *P. alpina*, Fckl., on *Viola biflora*, with still longer and rough pseudospores. Pl. 49, fig. 10 d.

**Puccinia senecionis.** *Lib. Fungi Exsic., No.* 92.

Sori gregarious, circinate, minute, punctiform, convex, covered

* *Puccinia hastata.* Cooke.—Amphigenis; acervulis sparsis, pulverulentibus, atro-brunneis; pseudosporis ellipticis, leniter constrictis, lævibus (·035-·04 × ·02-·025 m.m.), breviter pedicellatis; stylosporis globosis, lævibus (·02 × ·022 m.m.), ad foliis *Violæ hastatæ.* Maine, U.S. (E. C. Bolles, 68). Pl. 49, fig. 10b.

with the epidermis, which is depressed in the centre and perforated, nearly black ; pseudospores subovoid, rather small, somewhat apiculate, brown, smooth, peduncles very short.—*Corda Icones, iv. f.* 54. *B. & Br. Ann. N.H., No.* 1466.

On *Senecio aquatica.* Menmuir (Rev. M. Anderson).

This is clearly allied to *P. glomerata*, Grev., and *P. conglomerata*, Kze.; indeed they have been confounded together as synonymous, but without good reason, since all three appear to be distinct from each other.

**Puccinia Tripolii.** *Wallr. Fl. Germ.*, 223.

Sori large, compact ; pseudospores elongated, truncate at the apex, binodulose, or with a thick mammæform appendage.—*B. & Br. Ann. N.H. No.* 1467. *Pucc. Asteris, Cooke Fungi Britt. i., No.* 631.

On leaves of *Aster tripolium.* New Pitsligo (Rev. J. Fergusson). Near King's Lynn (C. B. Plowright).

British specimens agree with those found on the continent on the same *Aster*, and which are referred to *Puccinia Tripolii*, Wallr. Fuckel has described and published specimens of *Puccinia Asteris* (Fckl.) on leaves of *Aster simplex*, which does not appear to be specifically distinct. To this latter form we referred the specimens published in Fungi Britannici (ed. i., No. 631), but are convinced that all would be better placed under *Puccinia Tripolii*, Wallr. *Puccinia Asteris*, Schwein, is different, of which doubtless *Puccinia Gerardi*, Howe, is a variety. There appears to be slight variations peculiar to the different species of *Aster*, on which this common North American *Puccinia* is found, but none of them are sufficient to warrant the conclusion that they are distinct species.

**Puccinia Scrophulariæ.** *Libert Exs., No.* 193. *Cooke Handbook, No.* 1476.

As far as Libert's specimens go this is not a species of *Puccinia* at all, but of *Uromyces*. If the specimens found at Penzance, and cited by Berk. & Br. in Annals Nat. Hist., No. 471, be the same thing, then it must henceforth be included in its correct genus as *Uromyces Scrophulariæ*.

**Uromyces Geranii.** *DC.* (Sub. *Uredo.*)

*Trichobasis Geranii.* Cooke Handbook, No. 1589. Fungi Britannici, i., 440, ii. 50, with fig.

The specimens published, as above cited, are certainly *Uromyces*, and not *Trichobasis*.

**Coleosporium senecionis.** *Fr. S. V. S.*, 512.

Fckl. Sym. Myc., p. 43.—*Trichobasis senecionis*, Cooke Handbook, No. 1485. Fungi Britannica, i., 66, ii. 53, with fig.

It seems very doubtful whether this has any relation to *Puccinia glomerata*, as some authors have stated.

**Coleosporium pingue.** *Lev.* Var. **Alchemillæ.**

*Berk. & Br. Ann. N. H., No.* 1468. *Uedo alchemillæ.* P. & Ph. in "Grevillea," iii., p. 124.

Scotland, Wales, &c.

**Coleosporium ochraceum.** *Fckl. Fungi Rhen.* 302.

Hypophyllous; sori ochraceous, usually confluent, occupying the whole under surface, pulverulent, pseudospores subglobose, ochrey-yellow, epispore minutely rough.—*Uredo potentillarum v. Agrimoniæ D. Cand. Fl. Fr. vi. p.* 81. *Cooke Fungi Britt. i.*, 635.

On *Agrimonia eupatoria.* (Also New York, U.S.)

**Æcidium incarceratum.** *B. & Br. Ann. N. H., No.* 1469.

Sori minute, crowded in irregular spots, peridia included in the parenchyma of the leaf, pseudospores pallid.—*Rabh. Fungi Eur.*, No. 1492.

On leaves of *Sagittaria.* Bungay (D. Stock).

The tissue of the peridium is far more delicate than in most of the species. *B. & Br.*

**Uromyces concomitans.** *B. & Br. Gard. Chron.* 1874, *p.* 228.

Sori crowded in a ring, irregular, plane; pseudospores obovate, even, pedicels attenuated downwards.—*Ann. N. H., No.* 1470. *Grevillea iii. p.* 74, *with fig.*

On *Scrophularia nodosa*, surrounding pustules of *Æcidium.*

**Protomyces microsporus.** *Ung. Exanth.*

Spots white; spores globose, pallid.—*Berk. & Br. Ann. N. H., No.* 1471.

On leaves of *Ranunculus ficaria.* New Pitsligo.

**Protomyces Chrysosplenii.** *B. & Br. Ann. N. H., No.* 1472.

Spots white, rather thick. Spores globose, hyaline, pedicellate.

On leaves of *Chrysosplenium oppositifolium.* New Pitsligo (Rev. J. Fergusson).

**Protomyces Fergussoni.** *B. & Br. Ann. N. H., No.* 1473.

Spots or points brown, irregular. Spores obovate, at first hyaline, very shortly pedicellate, even, then brown.

On leaves of *Myosotis.* New Pitsligo (Rev. J. Fergusson).

**Protomyces menyanthis.** *De Bary Brandpilze, p.* 19.

*Cooke in Grevillea i., p.* 7.—*B. & Br. Ann. N. H., No.* 1474. *Cooke Fungi Britt. ii.*, 47. *Rabh. Fung. Eur. No.* 1500.

On leaves of *Menyanthes* and *Comarum.*

**Stilbum cuneiferum.** *B. & Br. Ann. N. H., No.* 1451, *t.* 1, *f.* 2.

Stem attenuated upwards, simple, or slightly divided, consisting of compacted threads, which are free above, and bear the obversely wedge-shaped pale greenish-brown spores, head ovate.

On rotten cabbage stalks. Batheaston. April.

Habit that of *S. rigidum.* Spores (·0004-·00045 in.) ·01-·011 m.m. long. *B. & Br.*

We have observed another *Stilbum* in company with the *Periconia*, in specimens distributed by Mr. Broome, with a long clavate head and globose spores half the diameter of those of the *Periconia.* It is a very interesting form, and will probably be met with again.

**Periconia brassicæcola.** *B. & Br. Ann. N. H. No.* 1452 *t., i. f.* 3.

Stem black, heads globose, at first grey, then black, spores cine-

reous, more or less attenuated towards each end.—*Rabh. Myc. Eur.*, *No.* 1662. *Cooke Fungi Britt. i.*, 647.

Forming dense masses in the inside of rotten cabbage stalks. Batheaston. April.

Spores (·0002-·0004 in.) ·005-·01 m.m. long.

**Periconia Phillipsii.** *B. & Leight. Ann. N. H., No.* 1453.

Very minute, stem attenuated upwards, head globose, spores globose, granulated.—*Phillips in Grevillea iii., pl.* 42, *fig.* 1. *Cooke Fungi Britt. ii. ined.*

On soil. Trefriw.

Spores (·0004 in.) ·01 m.m. diam. Looks at first sight like a little *Sphinctrina*, so minute that it is quite invisible to the naked eye. *B. & Br.*

**Cladotrichum uniseptatum.** *Cooke.*

Effused, black; flocci branched, furcate, nodulose, septate, upper joints inflated or cupulate; spores oblong, obtuse, constricted, uniseptate, often collapsed at the extremities, and then apparently truncate. Pl. 48, fig. 2.

On sticks. Darenth. March.

Forming thick black velvety patches, sometimes nearly an inch in length. Closely allied to *C. triseptatum*, but the spores are never more than uniseptate. The collapsed extremities cause the spores to assume a quadrate form, and then there is some resemblance to terminal septa in the line of the collapsed epispore, ·02 × ·01 m.m.

**Virgasporium.** *Cooke.*

Flocci erect, septate; spores terminal, clavate or baculæform, multinucleate or multiseptate, hyaline.

In habit very similar to *Cladosporium*, which the threads also resemble, but the spores are very different. The flocci are not so rigid, so highly developed, or so carbonized as in most species of *Helminthosporium*, indeed, but for the fruit, the closest affinity is with *Cladosporium* and *Passalora*.

**Virgasporium maculatum.** *Cooke. (Pl.* 48, *fig.* 4.)

Epiphyllous; flocci fasciculate, short, scattered over sub-orbicular or irregular tawny spots, simple or slightly branched, septate; spores terminal, linear, slightly thickened toward the base, multiseptate, hyaline (·04-·08 × ·005 m.m.).—*Cladosporium (?) maculatum, Cooke Fungi Britt. ii., with fig.*

On fading leaves of *Reseda*. Jersey.

To this genus also belongs *Helminthosporium clavatum*, Gerard,* and probably *Helminthosporium olivaceum*, B. & C., which we have not seen.

* Virgasporium clavatum. (*Ger.*) *Pl.* 48, *fig.* 4. Hypophyllis, floccis olivaceis, fasciculatis, erectis, brevibus, septatis. Sporis obclavato-elongatis, multiseptatis (·05-·75 × ·005 m.m,—On fading leaves of *Asclepias incarnata* (Gerard), and *Gerardia* (Peck). New York, U.S,—There are no definite tawny spots as in *V. maculatum*.

**Botrytis argillacea.** *Cooke, Fungi Britt. ed. ii., ined.*
Effused for 6-12 inches in length, clay-coloured. Fertile flocci branched, dichotomous above, tips slightly thickened, spores oval. Pl. 48, fig. 6.
On sticks. Darenth. April.

**Peronospora calotheca.** *D. By. Mem. Peronosp. p.* 111, *No.* 9.
Flocci slender, 7-9 times dichotomous, primary branches oblique, erect, the rest patent, squarrose, slender, ultimate ramuli short, straight or curved; conidia ellipsoid; oospores globose, epispore bay, minutely reticulated.—*Berk. & Br. Ann. N. H., No.* 1454. *P. galii, Fckl. Fungi Rhen. No.* 28.
On *Galium aparine.* Forden. Ap. (Rev. J. E. Vize.)

**Peronospora interstitialis.** *B. & Br. Ann. N. H., No.* 1455.
Spots hypophyllous, yellow, confined to the interstices of the veins, or very rarely extending slightly beyond them, flocci very short, flexuous, spores terminal, ovate, often seated obliquely.
On leaves of primrose. Glamis.
Allied to *P. obliqua.* Spores (·0006-·0007 in.) ·015-·0175 m.m. long.

**Peronospora rufibasis.** *B. & Br. Ann. N. H., No.* 1456.
Epiphyllous. Spots shining; tawny, pallid on the opposite surface, flocci linear, spores obovate or elongated, variable, obliquely attached, very shortly pedicellate.
On leaves of *Myrica gale.* Glamis (Rev. J. Stevenson).
Spots very conspicuous; closely allied to *P. obliqua* and *P. interstitialis.*

**Penicillium megalosporum.** *B. & Br. Ann. N. H., No.* 1457.
Snow white, short, flocci fasciculate; spores globose or elongated, even.
In an old chicken coop. Menmuir (Rev. M. Anderson).
Spores (·0005-·001 in.) ·0125-·025 m.m. diam., or equally variable when oblong.

**Fusarium minutulum.** *Ca. Icon. ii., fig.* 18.
Minute, punctiform, white, stroma superficial, convex, fibrous, white, spores minute, oblong, somewhat rounded at the extremities. —*Berk. & Br. Ann. Nat. Hist, No.* 1457.*
On rotten boards. St. Catherine's, Bath. Jan.
Spores (·0002 in.) ·005 m.m. long.

**Cylindrosporium.** *Unger. Exantheme, p.* 166. (Not Greville.)
Spores cylindrical, fasciculate, springing from the stroma.
The Rev. M. J. Berkeley thinks it probable that *Protomyces* is connected with the species as oospores.

**Cylindrosporium rhabdospora.** *B. & Br. Ann. N. H., No.* 1458.
Amphigenous, spots orbicular, brown; spores forming little radiating fascicles, oblong, slightly hollowed out at the sides, obtuse, triseptate.
On leaves of *Plantago.* Glamis (Rev. J. Stevenson).

Spores (·0008-·002 in.) ·02-·05 m.m. or more long. Sometimes a second is developed at the top of the first.—*B. & Br.*

**Cylindrosporium ficariæ.** *Berk.*

*Glœosporium Ficariæ.* Cooke Handbook, No. 1413.

**Cylindrosporium niveum.** *B. & Br. Ann. N. H., No.* 1459.

Spots numerous, crowded (1-2 lines) often confluent, brown-marginate. Spores snow-white, oblong, uniseptate, shortly pedicellate.

On *Caltha palustris.* New Pitsligo (Rev. J. Fergusson).

Spores, when mature, (·002 in.) ·05 m.m. long.

**Myxotrichum ochraceum.** *B. & Br. Ann. N. H., No.* 1475, *t.* 1, *f.* 4.

Yellow, then greenish, flocci elongated above, acute, ramuli deflexed.

On shavings of hurdle makers. Near Bath. Mar.

Spores (·00015 in.) ·0035 m.m. diam. When placed in alcohol they adhere in clusters, as if surrounded by a membrane or involved in mucus.—*B. & Br.*

**Fusidium geranii.** *West. Bull. d. Brux.*, 1851, *p.* 413.

Spots brown, rounded, scattered, rather irregular, confluent and undeterminate, occupying the greater part of the leaf. Spores cylindrical-oval, with one or two nuclei or pseudo-septate.—*Cooke Fungi Britt., No.* 685.

On leaves of *Geranium.* King's Lynn (C. B. P.).

**Mucor pruinosus.** *B. & Br. Ann. Nat. Hist., No.* 1495.

Small, snow-white, vesicles globose, reticulated, spores irregular.

Covering the soil of garden pots. Sibbertoft. Nov.

Spores (·0007-·0012 in.) ·0175-·03 mm.

**Thamnidium elegans.** *Link. Obs. i., p.* 45, *t. ii. f.* 45.

*Ascophora elegans.* Corda Icon. iii., fig. 43. Cooke Handbook," No. 1881.

On fowls' dung.

**Thamnidium Van Tieghemi.** *B. & Br. Ann. N. H., No.* 1496.

Fertile threads bearing at the apex a single macrosporangium, lateral branches in the upper portion dichotomous, bearing microsporangia, externally rough, containing 1-4, or more, spores.

*Thamnidium elegans, Van Tieghem, Ann. Sci. Nat., ser.* 5, *vol. xvii. p.* 321 (not Corda).

On cabbage stalks.

**Peziza diminuta.** *Rob. Desm. Ann. Sci. Nat.*, 1847, *viii.*, 185.

Very small, scattered or crowded, shortly stipitate, externally whitish, tomentose, at first globose, then open, hemispherical; disc concave, yellowish, or orange ($\frac{1}{2}$ m.m.). Asci clavate-cylindrical, sporidia oblong. *Peziza apala, Fungi Britt. Exs., No.* 287.

On dry culms of *Juncus.*

The specimens published as *P. apala*, B. & Br., in "Fungi Brit.," No. 287, are, as far as my own copy is concerned, this species, and *not* as named, the sporidia are very different. The figure 183 of this volume belongs to the present species. It may also be remarked here that *Pez. palearum*, Desm., is quite different

from Rabenhorst's "Fungi Europæi," No. 519, as determined by an authentic specimen from Desmazieres, the sporidia are much smaller and not septate, as in "Grevillea" iii., fig. 193, the paraphyses are long and pointed.

**Peziza (Dasyscypha) resinaria.** *Cooke & Phillips.*

Gregarious, stipitate; cups at first turbinate, then open ($\frac{1}{2}$-1 m.m.), clad externally, as well as the short stem with white villous down; margin inflexed. Disc pale orange yellow. Asci cylindrical (·05 m.m. long). Sporidia oval, minute (·005 × ·0025 m.m.). Paraphyses filiform.—*Phillips Elv. Britt. fasc. ii., ined.*

On resin of Spruce fir. Trefriw, N.W. May, 1874 (W. Phillips).

Mr. Phillips, adverting to the observations at p. 121, on *Peziza subtilissima, C.*, and other species of *Peziza* closely allied, has forwarded specimens of the above, which are clearly distinct from any hitherto described. Externally it is more like a minute form of *Peziza bicolor* than *Peziza calycina*, but the fruit is different, the hairs much shorter, and the whole plant much smaller. It is only necessary to compare the sporidia with those of allied species to recognize its claim to rank as a distinct species; these are most like those of *Peziza Agassizii*, B. & C., a North American species, but the asci and sporidia are much smaller, the latter being ·01 × ·005-·006 m.m. in *P. Agassizii*, and ·005 × ·0025 m.m. in the above. Fortunately Mr. Phillips is in possession of sufficient specimens to include this in the forthcoming fasciculus of his "Elvellacei Britannici," together with the *Cenangium* hereafter described.

**Ascobolus (Ascozonus.** *Renny*) **cunicularius.** *Renny in Journ. Bot., Dec.*, 1874, *p.* 355, *t.* 155, *fig.* 1-4.

*Peziza cunicularia Boud., Ann. Sci. Nat. x.* 258. To this Mr. Renny refers *Ryparobius argenteus*, B. & Br. Ann. Nat. Hist., *xi.*, p. 347.

**Ascobolus (Ascozonus) Woolhopensis.** *Renny in Journ. Bot., p.* 356, *t.* 153.

*Ryparobius Woolhopensis, B. & Br. Ann. N. H., xi., p.* 347.

On birds' dung. Hereford.

**Ascobolus (Ascozonus) Leveillei.** *Renny in Journ. Bot., t.* 154, *fig.* 1-5 *(not Crouan).*

On rabbits' dung. Hereford.

**Ascobolus (Ascozonus) Crouani.** *Renny. Journ. Bot., t.* 154, *f.* 6-10.

(Not *Ascobolus Crouani*, Cooke, which is a *Peziza* of the section *Humaria.*)

On rabbits' dung. Hereford.

**Ascobolus (Ascozonus) parvisporus.** *Renny Journ. Bot., t.* 156, *fig.* 1-5.*

On rabbits' dung. Hereford.

**Ascobolus (Ascozonus) subhirtus.** *Rénny Journ. Bot., t.* 155, *fig.* 4-7.

On rabbits' dung. Hereford.

**Cenangium subnitidum.** *Cooke and Phillips.*

Gregarious, erumpent, turbinate, becoming patellate, blackish brown; disc ($\frac{1}{2}$-1 m.m.), marginate, depressed, then plane or convex, externally naked, opaque or somewhat shining. Asci clavate-cylindrical; sporidia narrowly elliptical, curved, binucleate, pale amber color (·015 × ·005 m.m.). Stylospores fusiform, curved, (hyaline ·015-·02 m.m. long).—*Phillips Elv. Britt. fasc., ii. ined.*

On branches of alder. Trefriw, N.W., 1874 (W. Phillips).

The sporidia are probably at length uniseptate.

**Dermatea Ulicis.** *Cooke.*

Cæspitose or scattered, substipitate; cups at first turbinate, then open, externally reddish brown, furfuraceous (1-2 m.m. broad), disc darker, concave. Asci clavato-cylindrical; sporidia elliptical, uniseptate, brown (·012 × ·005 m.m.). Paraphyses subclavate and brownish at the tips.

On twigs of Ulex. Shere.

Externally of the color of ground coffee. Allied to such species as *Pez. fascicularis* and *Pez. furfuracea*, which are placed by Tulasne in *Dermatea*.

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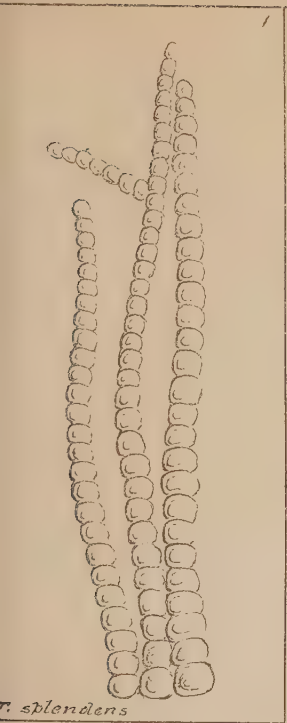
## CARPOLOGY OF PEZIZA.

(*Plates* 43, 44.)

The figures are drawn to the same scale as previously, for which see plate 28.

Fig. 199. Pezizatectoria, *Cooke*, Fungi Britt., ii., ined.
„ 200. P. cornubiensis, *B. & Br.*, ex, M. J. B.
„ 201. P. leporum, *Fckl.* Fungi Rhen., No. 1877.
„ 202. P. salmonicolor, *B. & Br.*, ex. M. J. B.
„ 203. P. araneosa, *Bull.* Fckl. Fungi Rhen., No. 2389.
„ 204. P. macrospora, *Wallr.*, Fckl. Fungi Rhen., No. 1223.
„ 205. P. umbilicata, *Karst.*, Fungi Fenn. No. 729.
„ 206. P. Gerardi, *Cooke*, ex. Herb. Gerard.
„ 207. P. Oocardii, *Kalch.*, Rabh. Fungi Eur., No. 521.
„ 208. P. cochleata, *Fckl.*, Fungi Rhen., No. 1230.
„ 209. P. pulchra, *Ger.*, fide W. R. Gerard.
„ 210. P. arenicola *Lev.*, ex. M. J. B.
„ 211. P. pusio, *B. & C.*, ex. M. J. B.
„ 212. P. sepulta, *Fr.*, ex. Fries in Herb., M. J. B.
„ 213. P. tomentosa, *Schwz.*, ex. Schweinitz, in Herb. M. J. B.
„ 214. P. stygia. *B. & C.*, ex. M. J. B.
„ 215. P. arenaria, *Osb.*, ex. M. J. B.
„ 216. P. asperior, *Nyl.*, Rehm. Ascomy., No. 3.
„ 217. P. erinaceus, *Schwz.*, ex. M. J. B.
„ 218. P. scutellata, *L.*, ex. M. J. B.
„ 219. P. margaritacea, *B.*, ex. M. J. B.
„ 220. P. setosa, *N.* Fckl. Fungi Rhen, No. 1866.
„ 221. P. gregaria, *Rehm. Ascomy.* No. 6. (= P. brunnea).
„ 222. P. livida, *Sch.*, ex. M. J. B.
„ 223. P. geaster, *B. & Br.*, ex. M. J. B.
„ 224. P. diversicolor, *Fr.*, ex. M. J. B.
„ 225. P. semitosta, *B. & Br.*, ex. M. J. B.
„ 225*. P. alphitodes, *B. & C.*, ex. M. J. B.
„ 226. P. pubida, *B. & C.*, ex. M. J. B.
„ 227. P. institia, *B.*, ex. M. J. B.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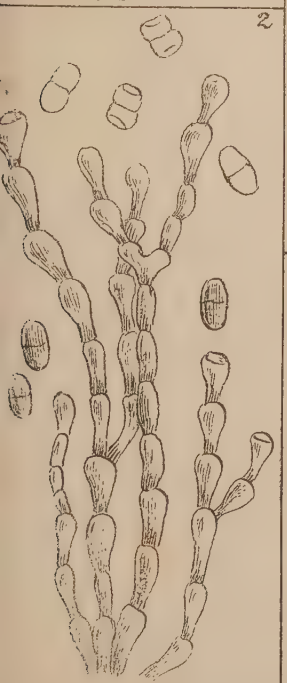
r. splendens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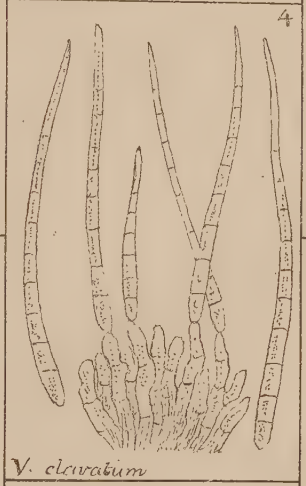
H. tubulosus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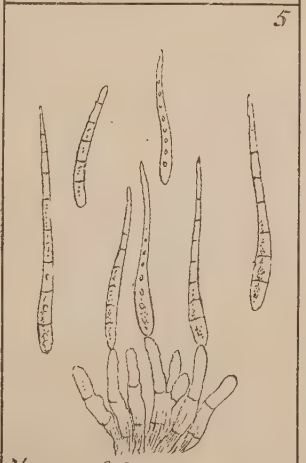
V. clavatum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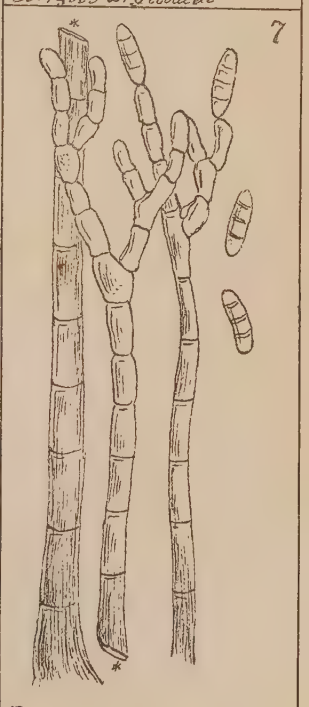
Botrytis argillacea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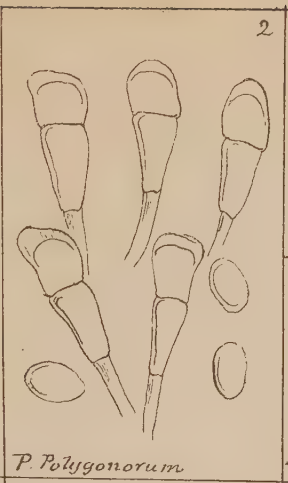
P. malvaccarum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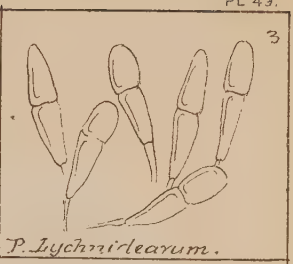
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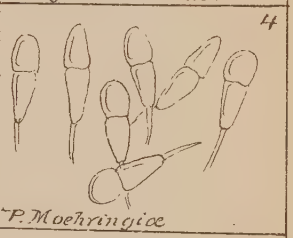
P. Lychnidearum.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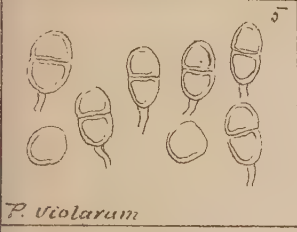
P. Moehringiae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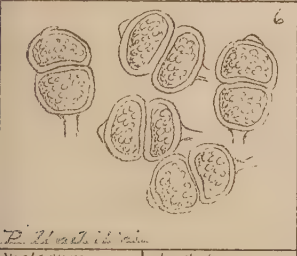
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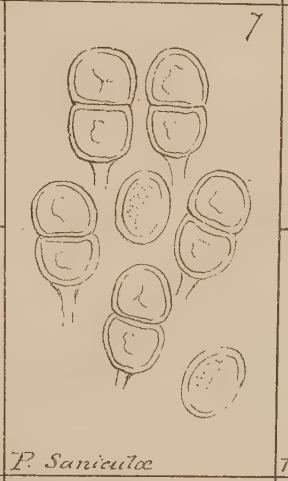
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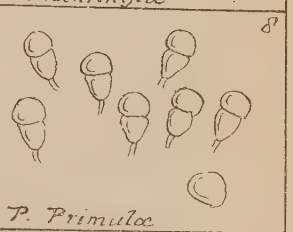
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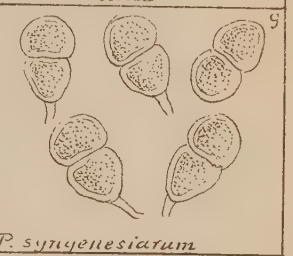
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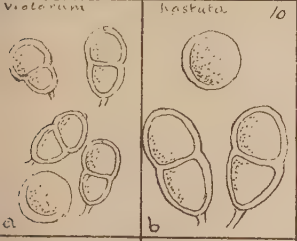


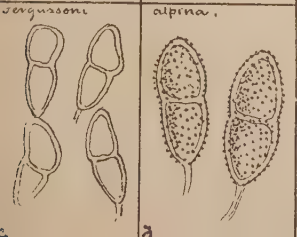


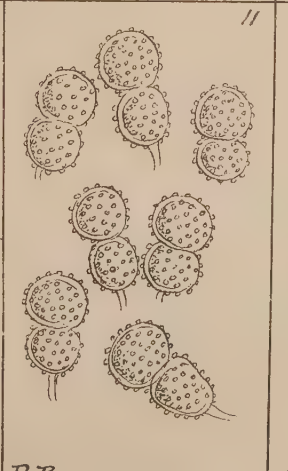
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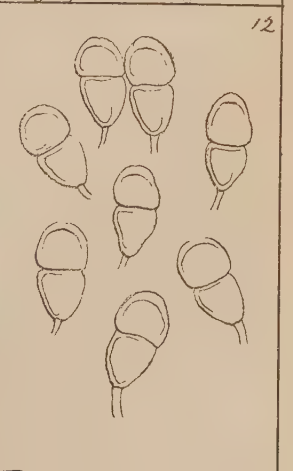
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# BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from Vol. iii., page* 186.*)*

**Agaricus (Lepiota) cinnabarinus.** *Fr. Epicr. ed. ii., p.* 36.

Pileus fleshy, soon flattened, obtuse, granulose-mealy, persistently vermilion; stem stuffed, somewhat bulbous, squamose below the ring; gills free, lanceolate, white.—*Ag. granulosus* v. *cinnabarinus*, Alb. & Sch., 147. *Fl. Dan. t.* 1795 (gills incorrect). *Berk. & Br. Ann. N.H., No.* 1402.

In pine woods. New Pitsligo.

Pileus 2-3 inches broad, flesh pallid, taste mild.

**Agaricus (Armillaria) subcavus.** *Schum. Fr. Epicr., ed. ii., p.* 46.

Pileus submembranaceous, convex, somewhat plane, viscid, striate to the middle, disc rather fleshy, umbonate; stem fistulose upwards, equal, punctulate, even above the torn ring; gills plane, decurrent, white.—*Schum. in Flor. Dan. t.*, 1843. *Berk. & Br. Ann N.H., No.* 1403.

On the ground. Cirencester. Nov.

Slender, wholly white, except the umber umbo.

**Agaricus (Tricholoma) panæolus.** *Fr. Ic. t.* 36, *f.* 2.

Pileus between spongy and compact, convexo-plane, variegated with pruinose grey spots; margin inflexed, repand; stem solid, short, fibroso-striate, gills arcuate, adnate, somewhat crowded, grey or dirty rufous.—*Fr. Epicr. ii.*, 73. *Berk. & Br. Ann. N.H., No.* 1404.

On the ground. Street (J. A. Clark).

**Agaricus (Tricholoma) pædidus.** *Fr. Ic. t.* 46, *f.* 1.

Pileus somewhat fleshy, tough, convex, then flattened, depressed about the conical umbo, fibrillose, becoming smooth, moist; margin involute, naked; stem stuffed, short, somewhat striate; gills sinuate-decurrent, crowded, narrow, white, then grey.—*Berk. & Br. Ann. N.H., No.* 1405.

In fields. Abergavenny (J. Renny). Wollaston (Miss Hume).

**Agaricus (Clitocybe) diatretus.** *Fr. Epic. ii., p.* 104.

Inodorous; pileus somewhat fleshy, convex, then plane, depressed, even, smooth, hygrophanous; stem stuffed, then hollow, elastic, even, straight, smooth and naked above; gills decurrent, with an acute tooth, crowded, narrow, white.—*Berk. & Br. Ann. N.H., No.* 1406.

In pine woods. Coed Coch.

Gathered at the same time with *A. fragrans*, from which it was at once distinguished by the total absence of the particular odour of that species.

**Agaricus (Clitocybe) angustissimus.** *Fr. Ic. t.* 59, *f.* 2.

Hygrophanous, inodorous; pileus rather fleshy, thin, convex, then plane or depressed, even, smooth, whitish; stem stuffed, then

fistulose, thin, naked, flexuous; gills adnate, narrow, very much crowded, white.—*Berk. & Br. Ann. N.H., No.* 1407.

In woods. Ascot.

**Agaricus (Collybia) muscigenus.** *Schum. Saell, p.* 307.

White; pileus submembranaceous, convex or plane, obtuse, even; stem stuffed, setaceous, flaccid, flexuose, equal, smooth; gills adnate, somewhat crowded, linear.—*Flor. Dan. t.* 2023, *fig.* 1. *Mich. t.* 73, *fig.* 1. *Berk. & Br. Ann. N.H., No.* 1408.

Amongst moss. Coed Coch.

Stem 1 inch, pileus 1-2 inches broad.

**Agaricus (Collybia) ambustus.** *Fr. Ic. t.* 70, *f.* 2.

Pileus submembranaceous, convexo-plane, papillate, striatulate, hygrophanous; stem somewhat stuffed, tough, short, livid; gills adnate, crowded, lanceolate, white, then tawny.—*Berk. & Br. Ann. N.H., No.* 1409.

On burnt earth. Kew.

**Agaricus (Collybia) Stevensoni.** *B. & Br. Ann. N. H., No.* 1497.

Pileus semi-ovate, obtuse, viscid, pallid, yellow, here and there spotted; stem thin, fibrillose, pulverulent above, externally and internally rufous, rooting; gills broad adnate with a decurrent tooth, distant, white.

Glamis (Rev. J. Stevenson). Aug.

Pileus ½ inch across and high; stem 1½ inch high, scarcely a line thick, composed of fibres.

Allied to *Agaricus ventricosus*, but differing in its slender almost solid stem, viscid, semi-ovate pileus, and very broad, adnate, somewhat ventricose, plane gills.—*B. & Br.*

**Agaricus (Mycena) galericulatus** var. **Calopus.** *Fr. Ic. t.* 80, *f.* 2.—*Berk. & Br. Ann. N.H., No.* 1410.

On blocks of wood in a fernery. Coed Coch.

**Agaricus (Mycena) ætites.** *Fr. Ic. t.* 81, *f.* 5.

Fragile; pileus membranaceous, campanulate, then convex, smooth, sulcate, hygrophanous, with a broad obtuse prominent umbo; stem unequal, somewhat compressed, smooth, shining; gills uncinate, subarcuate, thin, connected by veins, whitish.—*Fr. Epicr. ii.*, 143. *Berk. & Br. Ann. N.H., No.* 1411.

Amongst mosses. Ascot.

**Agaricus (Omphalia) philonotis.** *Lasch. Fr. Ic. t.* 76, *f.* 1.

Fragile, cinereous, dingy; pileus membranaceous, hygrophanous, floccose when dry; margin erect; stem fistulose, smooth; gills very decurrent, rather distant, narrow, white, then smoky.—*Fr. Epic. ii.*, 158. *Berk. & Br. Ann. N.H., No.* 1412.

On *Sphagnum*. Glamis (Rev. J. Stevenson).

**Agaricus (Omphalia) umbelliferus.** *Fr.* var. **Abiegnus.**—*Berk. & Br. Ann. N.H., No.* 1413.

On decayed fir stump. Coed Coch.

Pale yellow.

**Agaricus (Entoloma) resutus.** *Fr. Epicr. ii.*, 193.

Pileus somewhat fleshy, convex, obtuse, adpressedly squamulose or fibrillose, becoming brownish, centre darker; stem somewhat stuffed, equal, soft, smooth; gills slightly adnexed, ventricose, rather thick, grey.—*Berk. & Br. Ann. N.H., No.* 1414.

Pastures. Glamis (Rev. J. Stevenson).

Stem 1½-2 in. long, pileus 1 in. broad. Inodorous.

**Agaricus (Nolanea) icterinus.** *Fr. Epicr. ii.*, 209.

Pileus somewhat membranaceous, campanulate then convex, striatulate, papillate, greenish becoming yellowish, hygrophanous; stem somewhat stuffed, short, rigid, clad with flocculose meal; gills affixed or free, distant, ventricose, pallid.—*Berk. & Br. Ann. N.H., No.* 1415.

In gardens and woods. Edensor (J. Renny).

**Agaricus (Nolena) cœlestinus.** *Fr. Epicr. ii.*, 210.

Pileus membranaceous, campanulate, obtuse, striate, smooth, light-blue, disc darker, slightly scabrous, stem fistulose, even, smooth, dark steel-blue, pruinose above; gills adnate, very broad, somewhat crowded, whitish.—*Berk. & Br. Ann. N.H , No.* 1416.

On old oak trunks. Oct.

**Agaricus (Eccilia) flosculus.** *Smith Journ. Bot.* 1875, *p.* 97, *t.* 161, *f.* 4 9.

Pileus sub-membranaceous, pruinoso-crystalline, deeply umbilicate somewhat irregular, black-brown, becoming white with age; stem, pruinose or innato-fibrillose, cartilaginous with a fleshy pith, attenuated downwards; gills decurrent, somewhat waved, thick, pink; spores nodulose.

On the ground at the foot of and upon the stems of tree ferns *(Dicksonia antarctica)* at Messrs. Veitch's Nursery, Chelsea, June, 1870. Allied to the next, but a very different plant, the dark-brown trama and external pruinose-crystalline stratum are characteristic.

This species doubtless is not truly British, nor can the next be scarcely regarded as such.

**Agaricus (Eccilia) acus.** *Smith. Journ. Bot.* 1875, *p.* 97, *t.* 161 *f.* 14-20.

2. **Agaricus** *(Eccilia)* **acus,** *nov. sp.* Pileus submembranaceous, deeply umbilicate, densely pruinose, white; margin striate and incurved; gills thick, distant, deeply decurrent, pink; stem cartilaginous, smooth; odour strong, fungoid; spores nodulose.

Amongst germinating coffee-seeds in cocoa-nut fibre; Royal Gardens, Kew. Gathered by the Rev. M. J. Berkeley, in August, 1873. It differs in its snow-white pruinose pileus, and in other characters from all other described species. Its nearest ally is *A. carneo-griseus,* B. & Br.

**Agaricus (Eccilia) atropunctus.** *Pers, Syn. p.* 353.

Pileus somewhat fleshy, soft, hemispherical, pale-cinereous; stem somewhat tough, pallid, smooth, clothed with black punctiform squamulæ; gills decurrent, arcuate, distant, alternate, cinereous-

flesh-coloured.—*Fr. Epic., p.* 159. *ii, p.* 212. *Smith in Journ. Bot.* 1875, *p.* 98, *t.* 161, *f.* 10-13.

Amongst moss in an oak wood. Near Hereford. Oct. (Dr. Bull).

Gregarious, small, pileus $\frac{1}{2}$-$\frac{3}{4}$ in. across. Taste disagreeable, whole plant brittle, and the pileus inclined to be somewhat irregular.—*W. G. S.*

**Agaricus (Hebeloma) Bongardii.** *Weinm. Fl. Russ., p.* 190.

Pileus rather fleshy, campanulate, obtuse, disc squamose, torn and fibrillose about the margin, stem solid, rigid, pallid rufous, silky below, pulverulent and whitish above, gills adnate, ventricose, pale-reddish then cinnamon.—Fr. Epicr. ii, 229. Kalch. Ic. t. 20. f. 2. *Berk. & Br. Ann. N.H., No.* 1417.

On Culbin sand hills, near the Findhorn-mouth (G. Norman).

Stem 2-3 inches. Pileus 1-1$\frac{1}{2}$ in.

**Agaricus (Hypholoma) storea.** *Fr. Epicr. ii.*, 293.

Pileus fleshy, convexo-plano, umbonato, dry, fibrillose, stem solid, elongated, equal, even, subfibrillose, pallid, gills adnate, dry, livid, becoming brownish, margin serrulate and white.—*Berk. & Br. Ann. N.H., No.* 1418.

At the base of trees. Ascot. Coed Coch.

Stem 4-5 in. long 4 lin. thick; pileus 3 in. broad.

**Agaricus (Hypholoma) elœodes.** *Fr. Epicr. ii.*, 291.

Pileus fleshy, somewhat plane, subumbonate, dry, smooth, flesh yellow, stem stuffed, then hollow, equal, fibrillose, becoming ferruginous, gills adnate, crowded, thin, greenish then olive.—*Paulet t.* 108. *Bull. t.* 30, *Larbr. t.* 16, *f.* 2. *Berk. & Br. Ann. N.H., No.* 1119.

On trunks, &c. Slough (M. Terry).

**Agaricus (Hypholoma) silaceus.** *Pers. Syn. p.* 421.

Pileus fleshy, convex, viscid, orange-red, silky about the margin, whitish, stem stuffed, then hollow, bulbous, shining, fibrillose-striate, gills adnate, crowded, grey, then olive.—*Batt. t.* 22 *E. Berk. & Br. Ann. N.H., No.* 1498.

Glamis. (Rev. J. Stevenson.)

Pileus viscid, bright orange rufous; stem 4in. high, at length hollow, solid and slightly swollen at the base; smell resembling that of meal. Spores pale purple-brown.

**Cortinarius (Inoloma) traganus.** *Fr.*

Var. **finitimus** Weinm, p. 155. *B. & Br. Ann. N.H., No.* 1499.

Smell not at all that of the typical form, but pleasant though peculiar, resembling that of gum just beginning to ferment. Pileus silky, at length smooth, lilac, as is the stem, which is yellowish and mottled within, but not saffron-coloured nor brown.—*B. & Br.*

**Hygrophorus fornicatus.** *Fr. Epicr. ii.*, 414.

Whitish, pileus fleshy, thin, campanulate, then expanded, even, smooth, viscid; stem firm, equal, tough, smooth, gills sinuate,

adnexed, ventricose, thick, distant, white.—*Krombh. t.* 25. *fig.* 4. 5. *Berk. & Br. Ann. N.H. No.* 1420.

In pastures. Holm Lacy. Batheaston.

**Cantharellus albidus.** *Fr. Fl. Dan. t.* 1293, *fig.* 1.

Pileus rather fleshy, infundibuliform, repand, smooth, pallid, stem solid, nearly equal, smooth, gills dichotomous, divergent, white.—*Fr. Epic. ii.*, 457. *Berk. & Br. Ann. N.H., No.* 1421.

Amongst moss. Coed Coch. Sept. Oct.

**Cantharellus Stevensoni.** *B. & Br. Ann. N.H., No.* 1422.

Pileus orbicular, umbilicate, pallid, smooth, margin inflexed; stem cylindrical, delicately pulverulent, white, then darker; gills decurrent, pallid, brownish behind.

On rotten wood amongst moss. Glamis. March.

Pileus about 2 lines across, stem $\frac{1}{4}$ in. high, $\frac{1}{2}$ line thick, with a little white mycelium at the base. Very near to *C. cupulatus*, but that is very strongly umbonate when young, and the umbo is always visible at the bottom of the umbilicus, the habitat moreover is different.—*B. & Br.*

**Leutinus scoticus.** *B. & Br. Ann. N.H., No.* 1423.

Inodorous. Pileus smooth, hygrophanous, extremely variable, pallid, at length brownish, either quite stemless and reniform, or variously stipitate, solitary or cæspitose, sometimes deeply umbilicate, lobed at the margin, and sinuate or plicate, gills rather distant, strongly toothed, decurrent when the stem is developed.—*Fr. Ep. ed. ii., p.* 485.

On decayed *Ulex* and rotten wood. Glamis.

Pileus $\frac{1}{2}$-$1\frac{1}{2}$ in. broad, stem when present varying from 2 lines to as many inches. Its nearest ally is *L. omphalodes.*

**Boletus sulfureus.** *Fr. Epicr. ii., p.* 501.

Pileus compact, convex, then plane, silky-tomentose, with innate flocci, sulphur-coloured; stem firm, ventricose, even, smooth, of the same colour as the pileus; tubes adnato-decurrent, short, minute, compound, sulphur-coloured, at length greenish.—*Berk. & Br. Ann. N. H. No.* 1424. *Smith in Journ. Bot.* 1875, *p.* 98, *t.* 162, *fig.* 1-3.

On sawdust. Forres (Rev. J. Keith).

From a wide-spreading fleecy, golden-coloured mycelium it springs in dense clusters, after the fashion of *Agaricus spectabilis.* Stem compact, 1-2 in. long, an inch thick, self-coloured, but at length acquiring a dirty ferruginous tint. Pilei at first hemispherical, then by mutual pressure twisted and concrescent; margin acute, involute when young. Flesh yellow, turning more or less blue when broken, but when exposed for some time to the air golden, under the tubes occasionally reddish. Tubes 1-2 lines long, adhering more closely than usual, changing colour when touched, at length spotted with ferruginous stains. Spores yellow, then olivaceous, unusually small. Tasteless.—*W. G. S.*

**Boletus æreus.** *Bull. Champ. p.* 321.

Pileus pulvinate, smooth, sub-pelliculose, olivaceous brown, becoming somewhat blackish. Stem stout, somewhat reticulated, yellowish, brownish at the base, tubes minute, nearly free, sulphury. —*Krombh. t.* 36 *f.* 1-7. *Quél t.* 16, *f.* 2. *Rostk. t.* 15. *Berk. & Br. Ann. N.H., No.* 1425.

In woods. Surrey (M. Terry).

Spores oblong, oblique at the base, ·0004-·0005 in. × ·0002 in.

**Boletus carnosus.** *Rostk. t.* 14.

Compact. Pileus pulvinate, smooth, brown; stem short, firm, substriate, rufescent yellow; tubes adnate, yellow, pores rather large, angular, of the same colour.—*Fri. Epicr. ii.*, 520. *Berk. & Br. Ann. N.H., No.* 1426.

In beech woods. Stoke Pogis (M. Terry).

**Polyporus floccopus.** *Rostk. Sturm. Fl., No.* 28, *t.* 13.

Pileus coriaceous, mouse-coloured, floccose, stem floccose, pores hexagonal-oblong, white, crenate.—*Berk. & Br. Ann. N. H., No.* 1427.

On dead wood. Glamis (Rev. J. Stevenson).

**Polyporus trabeus.** *Fr. Epicr. ii.*, 547.

White. Pileus fleshy, fibrous, then firm, effuso-reflexed, transversely elongated, without zones, pallid, pores short, minute, roundish or elongated, toothed, white.—*Rostk. t.* 28. *Berk. & Br. Ann. N.H., No.* 1428.

On pine wood. Glamis. Menmuir.

**Polyporus borealis.** *Fr. Epicr. ii.*, 552.

White, then yellowish, pileus spongy, then suberous, compact, subpulvinate, hairy, internally parallel-fibrous, margin patent, unequal, sinuate, flexuous or torn, white.—*Rostk.* 4. *t.*, 40. *Schæff. t.* 314? *Berk. & Br. Ann. N.H., No.* 1429.

On fir trunks. Slough (M. Terry).

**Polyporus (Anodermei) Keithii.** *B. & Br. Ann. N.H., No.* 1430.

Conchiform, stemless, decurrent behind, bright red-brown, rough with rigid processes, hymenium pallid; dissepiments lacerated.

On dead wood. Forres (Rev. J. Keith).

About ½ in. across.

**Polyporus callosus.** *Fr. Epicr. ii.*, 577.

Effused, equal, tough, entire, like soft leather, separable, white, pores firm, rounded, equal, quite entire, obtuse.—*Berk. & Br. Ann. N.H., No.* 1431.

On dead wood. Glamis (Rev. J. Stevenson).

**Polyporus (Resupinati) collabefactus.** *B. & Br. Ann. N.H., No.* 1432.

Stratum quite smooth, resembling a Corticium; pores seem first to arise from the mere collapsing of the substance, always shallow, margin obtuse.

On dead wood. Glamis (Rev. J. Stevenson).

**Polyporus (Resupinati) Rennyi.** *B. & Br. Ann. N.H., No.* 1433.

Forming a thick, at first somewhat frothy, then pulverulent mass,

white, turning to lemon-coloured when dry, pores sparingly produced, white, elongated.

On wood and on to the ground. Hereford. Nov. (J. Renny). Glamis (Rev. J. Stevenson).

**Polyporus (Resupinati) blepharistoma.** *B. & Br. Ann. N.H., No.*1434.

Wholly resupinate, snowy-white, mycelium arachnoid, subfarinose, pores small, dissepiments thin, margin ciliato dentate.

On dead wood. Glamis.

Very thin and delicate, the ciliato-dentate margin of the pores is very elegant.

**Polyporus penetralis.** *Smith in Journ. Bot.* 1875, *p.* 99, *t.* 162, *figs.* 4-8.

On imported tree-fern stems, cannot be included as British. The same remark applies also to

**Laschia coccinea,** Smith, in "Journ. Bot.," 1875, *p.* 99, *t.* 162, *figs* 9-13—on trunk of *Encephalartus* in Bull's Nursery.

**Hydnum squamosum.** *Schæff. Fr. Epic., ed. ii., p.* 598.

Pileus fleshy, irregular, glabrous, broken into irregular rufous-brown scales; stem short, whitish, attenuated downwards; spines grey-brown, with a white apex.—*Berk. & Br. Ann. N.H., No.* 1435. Smith "Journ. Bot.," 1875, *pp.* 99, *t.* 161, *fig.* 1-3.

In pine woods. Street, Somerset.

Small, inflexible, flesh thick, white.

It is closely allied to *H. imbricatum*, but is distinguished by its smaller size, white flesh, and other characters. It also possesses an abominably fœtid odour, which is not the case with its allies.—*W. G. S.*

**Hydnum melleum.** *B. & Br. Ann. N.H., No.* 1436.

Honey-coloured, effused, thin, margin delicately byssoid, teeth acute at the tips, sometimes divided, pulverulent below, naked in the middle.

On broken rails lying on the ground. Coed Coch.

**Hydnum Stevensoni.** *B. & Br. Ann. N. H., No.* 1437.

White, effused, farinaceous beneath, here and there byssoid; spines cylindrical, obtuse or truncate, sometimes compressed; apices pulverulent.

Glamis. March.

**Hydnum anomalum.** *B. & Br. Ann. N. H., No.* 1438, *t.* 1, *f.* 1.

Pallid yellow, stratum thin, gelatinous, teeth at first granuliform, then stipitate, obtuse, divided above.

Inside rotten ash tree. Langridge. March.

Substance of teeth tough, with large ovate or globose vesicles immersed in it; spores globose, shortly pedicellate. Near to Fries's genus *Mucronella.*

**Radulum tomentosum.** *Fr. Ep. ed. ii., p.* 624.

Effused, innate, rather thick, white then pallid, swollen at the margin, erect, tomentose; tubercles short, crowded, angular, obtuse, smooth, confluent—*Berk. & Br. Ann. N. H., No.* 1439.

On *Pyrus aucuparia.* Menmuir.

# MICROMETRIC TABLES.

| I. Parts of a Millimètre to parts of an Inch. | | II. Parts of an Inch to parts of a Millimètre. | |
|---|---|---|---|
| M. Mètres. | Inch. | Parts of an Inch. | M. Mètres. |
| 10 | ·3937 | 1·0 | 25·399 |
| 9 | ·3543 | ·9 | 22·859 |
| 8 | ·3149 | ·8 | 20·321 |
| 7 | ·2755 | ·7 | 17·779 |
| 6 | ·2362 | ·6 | 15·239 |
| 5 | ·1968 | ·5 | 12·700 |
| 4 | ·1574 | ·4 | 10·160 |
| 3 | ·1181 | ·3 | 7·620 |
| 2 | ·0787 | ·2 | 5·080 |
| 1·0 | ·0393 | ·10 | 2·539 |
| ·9 | ·0354 | ·09 | 2·285 |
| ·8 | ·0314 | ·08 | 2·032 |
| ·7 | ·0275 | ·07 | 1·777 |
| ·6 | ·0236 | ·06 | 1·523 |
| ·5 | ·0196 | ·05 | 1·270 |
| ·4 | ·0157 | ·04 | 1·016 |
| ·3 | ·0118 | ·03 | ·762 |
| ·2 | ·0078 | ·02 | ·508 |
| ·10 | ·0039 | ·010 | ·253 |
| ·09 | ·0035 | ·009 | ·228 |
| ·08 | ·0031 | ·008 | ·203 |
| ·07 | ·0027 | ·007 | ·177 |
| ·06 | ·0023 | ·006 | ·152 |
| ·05 | ·0019 | ·005 | ·127 |
| ·04 | ·0015 | ·004 | ·101 |
| ·03 | ·0011 | ·003 | ·076 |
| ·02 | ·0007 | ·002 | ·050 |
| ·010 | ·00039 | ·0010 | ·0253 |
| ·009 | ·00035 | ·0009 | ·0228 |
| ·008 | ·00031 | ·0008 | ·0203 |
| ·007 | ·00027 | ·0007 | ·0177 |
| ·006 | ·00023 | ·0006 | ·0152 |
| ·005 | ·00019 | ·0005 | ·0127 |
| ·004 | ·00015 | ·0004 | ·0101 |
| ·003 | ·00011 | ·0003 | ·0076 |
| ·002 | ·00007 | ·0002 | ·0050 |
| ·001 | ·00003 | ·0001 | ·0025 |

A millimètre = ·03937 inch.

## ON A NEW BRITISH SPECIES OF ASCOBOLUS.

By W. Phillips, F.L.S.

**Ascobolus amethystinus,** n.s.—Sessile, scattered, at first sphærical, then expanded, concave, externally dark purple, verrucose; disc nearly black; margin serrated; asci cylindrical; sporidia 8, elliptical, rather narrow at the ends, hyaline, becoming purple, coarsely verrucose; paraphyses simple, enlarged at the apices. Sporid ·0011 × ·0006 in.

On damp sandy soil on the margin of the river Severn. Shrewsbury. Oct., 1875.

This beautiful species in its early condition is perfectly sphærical, without any trace of a pore at the summit, it then becomes fractured by an irregular aperture, which gradually expands, leaving rather a thin serrated margin to the cup. The cells composing the exterior are of a beautiful amethyst purple under the microscope, and when pressed yeild their coloring matter to surrounding objects. The cups attain a diameter of half an inch.

This species is near *A. atrofuscous*, but differs from it in the receptacle being purple, the sporidia narrow at the ends and more coarsely verrucose, the asci being cylindrical and the paraphyses enlarged at the summits, beside other characters given above.

**Peziza (Sarcoscypha) coprinaria.** *Cooke.*

Subgregarious, sessile, crimson. Cups hemispherical, soon flattened (1 c.m. broad); margin slightly elevated, fringed with long pale brown septate hairs; asci cylindrical; sporidia elliptical, smooth; paraphyses clavate at the tips, filled with orange granules.

On dung. Rannoch. Dr. Buchanan White.

A very distinct species. The cups remain flattened in drying, external cells very large, hairs ½ m.m. long. Sporidia ·02 × ·01. m.m. The hairs are never stellate as in *P. stercorea*, nor is the cup so densely hairy, the hairs being confined to the margin. The name of *P. hippocopra*, under which this species was first reported, has been replaced since it appears to have occurred on cow-dung. It is curious that at the same time an interesting species allied to *P. stercorea*, on dung, was sent from the United States by Mr. W. R. Gerard, which also is undescribed.*

* *Peziza scubalonta*, C. & Ger.—Scattered, sessile, rather fleshy. Cups hemispherical, soon expanded (1 c.m. broad), contracting when dry, externally strigose with rather dense pale brown hairs; disc concave, orange-red; asci cylindrical; sporidia elliptic, smooth (·018 × ·009 m.m.); paraphyses septate, slightly thickened upwards.

On horse dung. Catskill Mountains. W. R. Gerard.

Quite distinct from *P. stercorea*, to which it is allied, by the simple hairs and much smaller sporidia, as well as some other features. Hairs about 2 m.m. long.

# BRITISH FUNGI.

*By* M. C. Cooke.

*(Continued from page* 39.)

**Radulum deglubens.** *B. & Br. Ann. N. H., No.* 1440.

Orbicular, ferruginous, subdiaphanous; tubercles erect, subcylindrical, irregular, scattered, interstices even, pulverulent from the white spores.

On ash. Jan. Forres. New Pitsligo.

About ½ inch across.

**Radulum corallinum.** *B. & Br. Ann. N. H., No.* 1441.

Effused, white; subiculum shining, very thin, pelliculose; tubercles fasciculate, divided, obtuse, coralloid.

Oak branches. Scotland.

Effused for three inches; fascicles of tubercles ¼ or more across.

**Radulum epileucum.** *B. & Br. Ann. Nat. Hist., No.* 1442.

Effused, ochraceous white, wholly resupinate; subiculum snowy white, covered by a waxy stratum; tubercles scattered, cylindrical, slightly fimbriate, deciduous.

On decorticated wood. Glamis.

Effused for several inches, tubercles falling out and showing the white mealy subiculum, round which is an annular depression.

**Grandinia crustosa.** *Pers. Fr. Epic. ed. ii., p.* 627.

Floccoso-farinaceous, irregularly effused, crustaceous, adnate, white; granules somewhat rounded, crowded, obtuse.—*Berk. & Br. Ann. N.H., No.* 1443. *Nees Sys. f.* 247.

On *Polyporus versicolor.* Glamis. Feb.

**Kneiffia subgelatinosa.** *B. & Br. Ann. N.H., No.* 1440.

Thin, yellowish then cream-coloured; granules minute, subgelatinose, fimbriate at the tips.

On stumps of felled firs. Glamis.

Accompanied by a green alga, which penetrates the tissue of the fungus.

**Craterellus clavatus.** *Fr. Epic. ed. ii., p.* 632.

Pileus fleshy, turbinate, truncate or depressed, flexuous, unpolished, becoming somewhat yellowish, attenuated into a solid stem; hymenium even then corrugated, purplish then discoloured. —*Sverig. Atl. t.* 91. *Berk. & Br. Ann. N. H., No.* 1445. *Krombh. t.* 45, *f.* 13-17.

In a beech wood. Bisham, Berks.

**Cyphella fraxinicola.** *B. & Br. Ann. N.H., No.* 1446.

Minute, orbicular, externally snow-white, shortly villose; disc yellow, becoming brownish with the spores, proliferous.

On ash. Batheaston.

**Hyphelia rosea.** *Fr. Sys. Myc. iii* 211.

Thallus radiating, white, pseudo-peridium flattened, pubescent, membranaceous, very fragile; spores minute, globose.—*Berk. & Br. Ann. N. H., No.* 1447.

New Pitsligo.

**Clavaria curta.** *Fr. Epic. ii.*, 668.

Small, very much branched, greenish-yellow; stem none; branches short, crowded, obtuse.—*B. & Br. Ann. N. H., No.* 1448.

On the ground. Coed Coch. Holm Lacy.

**Clavaria tuberosa.** *Sow. Fung. t.* 199.

Simple, yellowish, attenuated at the apex, swollen in a bulbous manner at the base, attached by mycelioid fibrils.

On sticks. Forres (Rev. J. Keith).

"Exactly the long lost plant of Sowerby, which is perhaps too near *C. ardenia*; and possibly the same may be said of *C. juncea*, notwithstanding the great difference of size."—*B. & Br. N. H., Jan.* 1875, *pp.* 32.

**Trichobasis Primulæ.** *Cooke, Fungi Britt. ii., No.* 141.

*Uromyces Primulæ*, Lev. "Cooke Handbook," No. 1471.

**Trichobasis Iridis.** *Cooke Fungi Britt. ii., No.* 142.

*Uromyces Iridis*, Lev. "Cooke Handbook," No. 1466.

**Trichobasis Ulmariæ.** *Cooke, Fungi Britt. ii., No.* 146.

*Uromyces Ulmariæ*, Lev. "Cooke Handbook," No. 1461.

These three species all clearly belong to *Trichobasis*, and not to *Uromyces*. The peduncles are very fugacious, to say nothing of other points of structure in which the affinities are decidedly with *Trichobasis*.

**Eustegia arundinacea.** *Fr. Elench., ii.*, 112.

Erumpent, operculum collapsing, depressed, umbonate; cups at first membranaceous, pallid, then black. Asci linear-clavate, sporidia narrowly elliptical or subfusiform, straight, 1-2 nucleate, paraphyses copious, linear.—*Berk. & Br. Ann. N. Hist., No.* 1500. *Stegia Arundinacea*, Fckl. Syn., App. 328. *Peziza Kneiffii*, Wallr, Crypt. Fl. pp. 483 (not Rehm).

On reeds. New Pitsligo (Rev. J. Fergusson).

Sporidia ·01 mm. long.

This is one of the plants about which much confusion has gathered. Under the name of *Peziza Kneiffii*, specimens are found in some herbaria which are only forms of *Peziza fusca*, and Dr. Rehm has published in his Ascomyceten a very neat little *Peziza* under the name of *Peziza Kneiffii*, which is something very different. This is a true *Peziza* of the section *Dasyscypha* to which we have attached the name of *Peziza Winteri*, Dr. Winter having collated most of Dr. Rehm's species. Specimens of *Peziza Kneiffii* from the late C. Montagne, of *Eustegia arundinacea* from Fries, and also from Mougeot, are all, with slight variations in the size of the sporidia, intrinsically the same.

**Hysterium (Lophodermium) arundinaceum.** *Schrad. var.* **gramineum.**

*H. culmigenum*, var. β. Fr. Sys. Myc., ii., 591.

On leaves of grass. Forres.

Var. **culmigenum.** *Fr. Cooke Fungi Britt., i., No.* 459.

On sheaths of reed.

**Nectria citrino-aurantia.** *Lacr. Grevillea, ii., p.* 164. *Berk. & Br. Ann. N. H. No.* 1492, *t.* 2, f. 8.

On willow twigs. Batheaston. Dec.

Sporidia oblong (·0003-·00035 in.) ·0075-·0085 m.m. long.

**Sphæria (Villosæ) membranacea.** *B. & Br. Ann. N. H. No.* 1493, *t.* 2 *f.* 9.

Semi-immersed, perithecia large, membranaceous, clad with short flexible hairs; sporidia shortly fusiform, uniseptate.

On very rotten wood. Langridge. Ap.

Sporidia (·0015 × ·0007 in.), ·035 × ·0175 m.m., accompanied by a minute flask-shaped *Sphæronema*, with a long slender neck and minute globose spores; probably its stylosporous state. *B. & Br.*

**Venturia Alchemillæ.** *B. & Br. Ann. N. H., No.* 1493.*

Perithecia minute, crowded in small stellate spots, asci short; lanceolate; sporidia fusiform, uniseptate.—*Asteroma Alchemillæ. Grev. Fl. Ed., p.* 369. *Stigmatea Alchemillæ, Cooke Handbook, No.* 2796. *Fckl. Symb. Myc., p.* 96. *Fckl. Fungi, Rhen, No.* 425.

On leaves of *Alchemilla.*

Sporidia (·0005 in.), ·0127 m.m. long.

The following species are also figured on Plate 48, fig. 7; *Dendryphium ramosum, C.*, Plate 49, fig. 1; *Puccinia malvacearum*, 2. *P. Polygonorum;* 3. *P. Lychnidearum*; 4. *P. Mœhringiæ*; 5. *P. violarum*; 6. *P. Umbilici*; 7. *P. Saniculæ*; 8. *P. Primulæ*; 9. *P. Syngenesiarum*; 11. *P. Prunorum*; and 12. *P. Tunaceti*, all × 500 (see scale).

**Thelephora intybacea.** *Fr. Epicr. ii.*, 635.

Cæspitose, soft, whitish then ferruginous—red, at length fuliginous; stems somewhat lateral, growing together; pilei imbricate, fibrous, margin dilated, at first fimbriate and whitish, then entire and of one colour; hymenium inferior, papillose, subfloccose. *Pers. Syn., p.* 567; *Bull. Champ. t.* 483 *f.* 6-7, *and t.* 278.

On the ground in woods. Glamis. Rev. J. Stevenson.

Exhibited at the Fungus Show at Perth.

**Geaster Michelianus.** *B. & Br.*

Mr. Worthington G. Smith has expressed an opinion in the "Gardener's Chronicle" that *Geaster cryptorrhynchus*, Kalch., figured and described by Professor Hazslinszky in this journal, is identical with the above species. There is a slight difference in the size of the spores in Hazslinszky's specimen and the *Geaster Michelianus* found by Mr. Beech in this country, but that alone would not be sufficient to maintain them as distinct.

**Badhamia fulvescens.** *Cooke.*

Peridia sessile, subglobose, scattered, or 3-6 together, tawny-ochre, towards the base clad with a delicate white pubescence; spores pale brown, minute, ovate.

On old sacking. Dupplin Castle, Perth.

Spores (·0003 in.) ·0075 m.m. diam.

The cysts investing the spores are quite distinct. I am indebted to Mr. C. E. Broome for examining this plant, and he coincides in the opinion that it is undescribed.

**Ustilago intermedia.** *Schröter.*

Produced within the florets, violet-brown; spores subglobose, ovate, or shortly elliptic, rather large; epispore minutely spinulose.—*Schröter in Rabh. F. Eur. No.* 1696.

On flowers of *Scabiosa.* Scotland. Rev. J. Fergusson.

The spores are larger and darker than in *U. flosculorum;* in the latter being ·01 m.m., and in the present species ·015 m.m.

**Isaria spumarioides.** *Cooke.*

Densely cæspitose, white, palmate or infundibuliform; apex crispate, lobed, or serrate, attenuated downwards into a slender stem, more or less connate; spores subglobose, minute.

On bark. Knowsley. Rev. H. Higgins.

A very curious and distinct species, not unlike *Spumaria alba* at a superficial glance, forming large patches an inch broad. Spores ·004-·005 m.m. diam.

**Clasterisporium vermiculatum.** *Cooke.*

Effused, forming a thin black stratum on the wood; mycelium creeping, branched or simple, septate, brown; spores erect, often fasciculate, cylindrical-fusiform, dark brown, multiseptate, straight, curved or geniculate, obtuse and pale at the extremities (·15-·2 m.m. long).

On oak wood. Hereford. Mr. Griffith Morris.

This interesting black mould is certainly congeneric with *Clasterisporium caricinum,* Schweinitz, and resembles *Helminthosporium* without flocci, the spores being seated on the mycelium. Another rather aberrant form we have received from J. B. Ellis, New Jersey, U.S., to which the name of *Clasterisporium subulatum,* C., has been given, in which the apices of the spores are subulate. *Clasterisporium pedunculatum,* Peck, is = *Helminthosporium attenuatum,* C. & P.

**Virgasporium.**—Dr. Saccardo has pointed out that the genus characterised under this name in "Grevillea" is identical with *Cercospora,* Fres., and that *Virgasporium maculatum* is equal to *Cercospora Resedæ,* Fckl. Sym. Myc. p. 353, and Fung. Rhen. No. 1632. Such being the case the other species will bear the name of *Cercospora clavata.*

*(To be continued in next number.)*

# SYMBOLÆ AD FLORAM MYCOLOGICAM AUSTRALIÆ.

Publicatæ per F. de Thumen.

## I.

### HYMENOMYCETES.

Determ.—C. Kalchbrenner.

1. **Agaricus (Lepiota) excoriatus,** *Schff.* Fr. Hymenomyc. eur. p. 30. —Gracemere in locis aridis, leg. O'Shanesy. No. 117. Com. F. de Mueller.

2. **Agaricus (Lepiota) procerus,** *Scop.* Fr. Hymenomyc. eur. p. 29.— Rockhampton, in Queensland, in regionibus calidioribus vulgaris, leg. Thozet. Com. Müller.

3. **Agaricus (Lepiota) leontoderes,** *Berk. et Br.*, in Fungi Ceylon (Linn. Soc. Journal of Botany xi).—Gracemere in collibus aridis leg. O'Shanesy. No. 109. Com. Müller. "Cape Orange." (Non tuto determinandus.)

4. **Agaricus (Lepiota) clypeolarius,** *Bull.* Fr. Hymenomyc. eur. p. 32.—Gracemere in terra leg. O'Shanesy. No. 111. Com. de Müller.

5. **Agaricus (Lepiota) cheimonoceps,** *Berk. et Curt.*, in Fungi Cubenses (Linn. Soc. Journal of Botany x).—Rockhampton, in Queensland, leg. Thozet. No. 691. Com. de Müller. "Cape white, stipes hollow."

Habitus Agarici clypeolarii minoris. Pileus umbonatus, 1″ latus, mollis, tomentoso-pulverulentus, albus. Stipes deorsum incrassatus, $1\frac{1}{2}$″ longus, albofurfuraceus. Annulus lacerus, disparens.

6. **Agaricus (Lepiota) granulosus,** *Fr.* Fr. Hym. eur. p. 36.— Rockhampton in Queensland, in terra, leg. A. Thozet. No. 714. 717. Com. de Müller. Specimina nimis manca.

7. **Agaricus (Omphalea) scyphiformis,** *Fr.* Fr. Hym. eur. p. 159.— Gracemere inter gramina pascuorum leg. O'Shanesy. No. 100. Com. de Müller. "From its pure whiteness and delicacy it appears like little flower."

8. **Agaricus (Pleurotus) illuminans,** *Müller.*—Rockhampton in Queensland, in ligno emortuo, leg. A. Thozet. No. 733. Com. de Müller.

Descriptioni Berkeleyi in Linn. Soc. Journal of Bot. xiii. sat convenit, sed-an phosphoreus fuerit, non constat. Specimina etiam nimis manca.

9. **Agaricus (Pleurotus) corticatus,** *Fr.* Fr. Hym. eur. p. 166.— Gracemere in truncis emortuis leg. O'Shanesy. No. 118. Com. de Müller.

Forma minor, pileo villoso, albo, annulo obliterato.

# NEW BRITISH FUNGI.

*By* M. C. Cooke, M.A.

*(Continued from page 69.)*

**Puccinia Luzulæ.** *Libert. Exs.* 94.

Spots purplish. Sori scattered, somewhat rounded, girt by the ruptured epidermis, amphigenous. Spores brown, elongated, lower cell pyriform, upper cell subglobose, quadrate or irregular, with a thickened epispore, pedicels long, hyaline.

On living *Luzula.* Darenth.

This is considered the perfect condition of *Trichobasis oblongata.* (*See* "Handbook.")

**Puccinia Cirsii.** *Lasch. Rabh. F. Eur.* 89.

Uredo-spores.—Sori scattered, pulverulent, brown. Spores globose, cinnamon-brown, granular, at length delicately roughened. *Uredo Cirsii*, Lasch. Rabh. F. E. 90.

On leaves of *Cirsium.* Scotland.

Brand-spores.—Sori scattered, dark-brown, epiphyllous, encircled by the ruptured cuticle. Pseudospores shortly pedicellate, obtuse, dark-brown.—*Thumen F. Austr., No.* 68. *Sacc. Myc. Ven.*, 128.

On leaves of *Cirsium.* Dupplin Castle, Perth.

Fuckel's Fungi Rhen., No. 340. is *Puccinia syngenesiarum*, and not the species published by Lasch.

**Peronospora Violæ.** *D. By. Ann. Sc. Nat.* xx. *p.* 125.

Effused. Flocci fasciculate, rather short, 2-6 times dichotomous, ultimate ramuli shortly subulate, deflexed; conidia ellipsoid, slightly apiculate.

On living leaves of *Viola.* Forden. Rev. J. E. Vize.

Apparently rather too close to *Peronospora effusa.*

**Ramularia Violæ.** *Fckl. Sym. Myc. p.* 361, *t. i. fig.* 26.

Tufts delicate, in orbicular white spots, with a brownish border; flocci very short, simple, fasciculate; spores cylindrical, obtuse, simple, hyaline.—*Oidium fusisporioides*, Fckl. Fungi. Rhen, No. 134.

On leaves of *Viola.* Forden. Sept., 1875.

Spores ·008 × ·002 m.m.

**Ramularia Ulmariæ.** *Cooke.*

Tufts greyish-white, forming irregular ovate or angular spots, mostly circumscribed by the veins; flocci very short; spores cylindrical, obtuse, simple, hyaline.

On under surface of leaves of *Spiræa Ulmaria.* Near Manchester. T. Brittain.

Spores ·03-·04 × ·007 m.m.

**Geoglossum microsporum.** *Cooke & Peck.* "Mycographia," fig. 11. Var. **tremellosum.**

Sporidia biseriate, cylindrical, or subfusiform, hyaline, becoming at length faintly 5-7 septate.

On the ground. Rannoch. Dr. Buchanan White.

This is referred to the American species as a variety, but it seems to be more tremellose than the typical form, and the sporidia do not flow out and cover the surface of the club; this may be accounted for in that the specimens were not so fully matured. Sporidia ·03 m.m. long.

**Peziza (Humaria) Phillipsii.** *Cooke Mycographia ii., fig.* 88.

Sessile scattered, fleshy, cup-shaped, at length expanded, externally fuliginous, rough; hymenium, dark vinous, plane, margin sometimes crenulate, sporidia elliptic, attenuated at each end, verrucose, paraphyses clavate, septate. *Ascobolus amethystinus*, Phillips in part.

On sandy ground. Shrewsbury.

Sporidia ·025 × ·011 m.m.

**Peziza (Humaria) violascens.** *Cooke, Mycographia ii., fig.* 83.

Subhemispherical, violaceous-brown, whitish at the base, seated on pallid rooting fibrils, hymenium plane or convex, asci cylindrical. Sporidia globose, uninucleate, granular. Paraphyses filiform. *Ascobolus Persoonii*, Crouan Flor. Fin., p. 56.

Amongst small mosses. Shrewsbury (W. Phillips).

Cups 5-7 m.m. broad. Sporidia ·008-·009 m.m. diam.

**Peziza (Humaria) lechithina.** *Cooke.*

Gregarious, sessile, egg-yellow; cups (5 m.m. broad), hemispherical, then flattened, becoming convex; margin narrow, distinct; asci cylindrical; sporidia elliptical, smooth; paraphyses septate, clavate above, filled with orange granules. *Cooke, Mycographia, ii, fig.* 89.

On old trunk crossing a stream. Sept. Forden.

This interesting species is quite distinct from anything hitherto described. Sporidia ·025 × ·012 m.m.

**Peziza (Humaria) constellatio.** *B. & Br. Ann. Nat. Hist.*

Scattered, sessile, red. Cups (1-2 m.m.) hemispherical, soon flattened, disc at length convex; asci cylindrical; sporidia globose, smooth; paraphyses profuse, filiform, filled with orange granules. —*Peziza humosa, Rehm Ascomy. No.* 4. *Cooke, Mycographia, ii, fig.* 81.

On the ground. Hereford (W. Phillips). Kent (M. J. B.).

Sporidia ·012-·013 m.m. The same species was sent us by Professor Saccardo from Italy, under the name of *Peziza humosa*. There is a slight difference in the size of the sporidia from different localities ranging from ·011 to ·013 m.m. diameter. In all there are the same linear granular orange paraphyses, in great number, curved at the tips. Fuckel's *Crouania humosa* has much larger sporidia (·016 m.m.), though it is doubtful whether this is sufficient to constitute it a distinct species, in the absence of any other difference.

**Peziza (Humaria) pluvialis.** *Cooke.*

Gregarious, sometimes densely crowded, rather soft, flesh-colour, or with an orange tint. Cups ($\frac{1}{2}$ m.m. broad), soon flat-

tened, and plane or slightly convex, with radiating white byssoid filaments at the base; asci cylindrical; sporidia elliptical, hyaline, smooth; paraphyses filiform, numerous, distinct, granular. *Cooke, Mycographia, fig.* 90.

On a damp wall. Eastbourne (C. J. Müller). On wall paper. Chichester (Dr. Paxton).

Sporidia ·018 × ·008 m.m.

In both instances this *Peziza* was found after the heavy rains in early summer. There is a little difference in the two specimens. The Eastbourne specimens have more of an orange tint, the cups are less crowded, and the white mycelium is more distinct, but the fruit corresponds in both. The Chichester specimens resemble externally some forms of *Ascobolus carneus;* both are rather closely allied to *Peziza Franzoniana*, Not. (Mycographia, fig. 68), but perhaps distinct in the sporidia, and more profuse and decided paraphyses, as well as some other features.

**Peziza (Sarcoscypha) coprinaria.** *Cooke in Grevillea iv., p.* 91.

On cow dung. Rannoch.

**Peziza (Dasyscypha) comitessæ.** *Cooke.*

Cæspitose or single and gregarious, bright golden-yellow, externally paler, and tomentose, stipitate, common stem branching below. Cups at first clavate, then expanded and cupulate; asci cylindrical; sporidia minute, linear, straight or curved; paraphyses filiform. *Fungi Britt., ii., No.* 371.

On a fallen tree. Dupplin Castle, Perth.

Asci ·05 × ·006 m.m.; sporidia ·006-·0075 m.m. long.

The branching stem resembles that of *Peziza pygmea*, to which this species is allied; the tufts contain from two to four cups proceeding from a common stem, or sometimes single. It is an elegant species dedicated to the Countess of Kinnoull, on whose estate it was discovered.

**Peziza (Hymenoscypha) monilifera.** *Fckl. Sym. Myc.* 310.

Stipitate, scattered, or cæspitose. Cups seated amongst *Bispora*, at first subclavate, at length dilated; disc concave, patellate when mature, marginate, waxy, externally and rather long stem, smooth, pallid brown; disc slightly darker; asci elongated; sporidia biseriate, oblong, attenuated towards each end, but obtuse, at length uniseptate, hyaline; paraphyses filiform, subclavate.

Amongst *Bispora monilioides* on cut timber. Dupplin Castle.

Cups 1-2 m.m. broad, 1-3 m.m. high; sporidia ·012 × ·004 m.m.

Fuckel has constituted a new genus under the name of *Bispora* for this species, of which he assumes that *Bispora monilioides* is the conidia form.

**Helotium scoparium.** *Cooke.*

Scattered or subgregarious, pallid, sessile; disc convex, rather paler, whole plant becoming greyish in drying; asci clavate; sporidia cylindrical, obtuse, straight or curved, binucleate, at

length with the endochrome divided; paraphyses simple, filiform, slightly granular.

On dead twigs of broom. Dupplin Castle, Perth.

Cups 1 m.m. broad; Asci ·1 × ·02 m.m.; sporidia ·02-·025 × ·005 m.m.

**Ascobolus amethystinus.** *Phillips, Grevillea iv., p.* 84.

On damp sandy soil, near Shrewsbury.

**Ascobolus crenulatus.** *Karst. Fung. Fenn. No.* 763.

Gregarious, sessile, at first sphæroid, then flattened, nearly plane, greenish-yellow, furfuraceous; margin crenulate (1-5 m.m. broad); asci clavate; sporidia elliptical, striate, violet, becoming brownish; paraphyses slender.—*Karst. Myc. Fenn. i. p.* 77.

On grouse dung. Rannoch. Dr. Buchanan White.

Sporidia ·012-·016 × ·006-·008 m.m.; cups about 1-1½ m.m. broad; disc of the Rannoch specimens, vinous when old, retaining the greenish colour at the base of the cups.

**Ascobolus (Saccobolus) obscurus.** *Cooke.*

Subgregarious, sometimes densely crowded, fuliginous, hymenium convex, rather paler. Asci clavate. Sporidia elliptical, rough, becoming violet, collected into an elliptical mass. Paraphyses linear.

On old sacking. Forden.

Cups ¼-¾ m.m. Sporidia ·012-·014 × ·007 m.m.

**Ascobolus (Ascophanus) pilosus.** *Fr.*

Minute, sessile, yellow, testaceous-yellow or tawny-orange, externally pilose with long hairs; disc papillate; margin naked; hairs simple, incrassated at the base; asci clavate; sporidia hyaline, oblong ovate; paraphyses slender, septate, simple, or branched, granular. *Boud. Mem. p.* 64.

On grouse dung. Rannoch. Dr. Buchanan White.

Cups $\frac{1}{10}$th m.m. broad; sporidia ·02 × ·01 m.m.

This is referred to *A. pilosus* as a variety, but the specimens were more minute than usual, scarcely visible to the naked eye, pallid. It differs from any form of *A. papillatus* and *A. ciliatus*, in the hairs not being marginal but clothing the surface of the cup; they are also more slender than in the other species. It was accompanied by a minute *Ryparobius* and *Sphæria* (*Sporormia*) *Notarisii*.

**Xylaria Scotica.** *Cooke.*

Suberose; stem very long, pallid, root-like, slender, 1-3 times dichotomously branched above; branches elongated, or very short and fasciculate; heads elongated, subcylindrical; apex more or less acute, greyish-brown, then black; perithecia very numerous, slightly papillate; asci cylindrical; sporidia uniseriate, elliptical, brown, minute.

On the ground. Meihlouer. Mr. Matheson.

Entire length, including rooting base, 2 to 6 inches. Clubs about 1 inch long; sporidia ·005-·006 × ·003 m.m.

A most interesting addition to the British Flora. It was exhibited at the Perth Fungus Show, and is wholly unlike any described species. The sporidia are smaller than in any other British *Xylaria*. Commonly 6-8 heads arise from the rooting stem.

**Valsa lauro-cerasi.** *Tul. Carp.* ii. 196.

Stylospores = *Ceuthospora lauri*.

Ascophore = Perithecia 6-8, disposed in a circle, raising the cuticle, which is sometimes blackened above the swollen clusters; asci clavate; sporidia narrowly elliptical, small, hyaline, straight.—*Cooke Fungi Britt.* ii. *ined.*

On branches of cherry laurel. Forden.

Not having seen specimens, which are authenticated as the species intended by Tulasne, it is difficult to determine whether our plant is his species. The sporidia are larger, but for the present it seems advisable to include it under his name.

This is interesting from its association with *Ceuthospora Lauri*, which occurred at the extremities of the twigs; passing downwards it was replaced by the *Valsa*, which resembled the former so closely that the two could scarcely be distinguished by a lens. On the older branches the absence of the blackened cuticle caused the resemblance to be less perfect. Asci ·04 m.m. long; sporidia ·01-·012 m m. long.

**Sphœria (Sporormia) Notarisii.** *Car. Rabh. Fung. Eur.* 976 b.

Perithecia black, rather shining, ovoid or rounded; ostiola wart-like or mamillæform; asci cylindrical, octosporous; sporidia tetramerous, brown, not apparently surrounded by a hyaline coat.—*Hedwigia*, 1868, *p.* 69, *t.* 1, *fig.* 1.

On grouse dung. Rannoch. Dr. Buchanan White.

Sporidia ·022-·026 × ·004-·005 m.m.; segments of the sporidia ·005-·006 m.m. long.

**Sphœria (Sordaria) curvula.** *D.By. Morph. Pilze, p.* 209.

Perithecia scattered, superficial, or rarely semi-immersed, oblong-conical, rugulose, densely clothed with articulate fasciculate brown hairs; asci broad, cylindrical, stipitate; sporidia ovate or elliptic, dark brown, with hyaline terminal appendage; paraphyses articulated, longer than the asci.—*Sphœrea stercorarai*, Fungi Britt. i. 589.

On cow dung. King's Lynn (C. B. Plowright). Rannoch (Dr. Buchanan White).

Sporidia ·029 × ·015 m.m., without appendage.

**Sphœria (Denudatæ) ostioloidea.** *Cooke.*

Gregarious. Perithecia minute, black, subglobose, with a slight papillate ostiolum, seated on the stroma of *Diatrype;* asci cylindrical, narrow; sporidia uniseriate, linear, straight, minute, hyaline.

Parasitic on *Diatrype quercina.* Forden.

Quite different from *Sphœria nigerrima.* The perithecia are very

minute, looking like the ostiola of the *Diatrype*. Asci ·04 × ·004 m.m; sporidia ·008 m.m. long.

**Lophium fusisporum.** *Cooke.*

Perithecia subsessile, expanded upwards, conchiform, laterally compressed, black, shining, striate. Asci subcylindrical. Sporidia fusiform, multiseptate (about 7) yellowish.—*Lophium mytilinum. Cooke Fungi, Britt. ser. ii.*, 200.

On fir branches and bark.

Sporidia ·05 m.m. long. I have now no doubt that the true *L. mytilinum* has filiform sporidia the length of the ascus, as described in "Handbook." Specimens from Dr. Capron, of Shere, and in Fiedler's "Exsicc." are of this character. Fuckel's No. 762 in my copy is sterile.

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DESCRIPTION OF PLATE LXIV.

Fig. 1. Specimen of *Xylaria Scotica*, natural size.
„ 2. Section of portion of club.
„ 3. Ascus and sporidia × 500.
„ 4. Asci and sporidia of *Sphæria ostioloidea* × 500.
„ 5. Asci and sporidia of *Valsa lauro-cerasi* × 500.
„ 6. Ascus and sporidia of *Ascobolus crenulatus*, with free sporidia × 500.
„ 7. Ascus and sporidia of *Ascobolus (Saccobolus) obscurus*, with free sporidia × 500.
„ 8. Threads and spores of a variety of *Helminthosporium echinulatum*, on *Ornithogalum* × 500.
„ 9. Spores of *Badhamia fulvescens* × 500.
„ 10. Ascus and sporidia of *Pezizo Comitessæ* × 500.
„ 11. Spores of *Clasterisporium vermiculatum* × 500.
„ 12. Ascus and sporidia of *Peziza Phillipsii* × 500.
„ 13. Ascus and sporidia of *Helotium scoparium* × 500.
„ 14. Threads and spores of *Verticillium tumorum* × 500.

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## SOME INDIAN FUNGI.

*By* M. C. Cooke, M.A.

**Septoria Artocarpæ.** *Cooke.*

Peritheciis aggregatis in maculis brunneis orbicularibus insidentibus. Sporis minutis linearibus.

On leaves of *Artocarpus integrifolea*. Mysore.

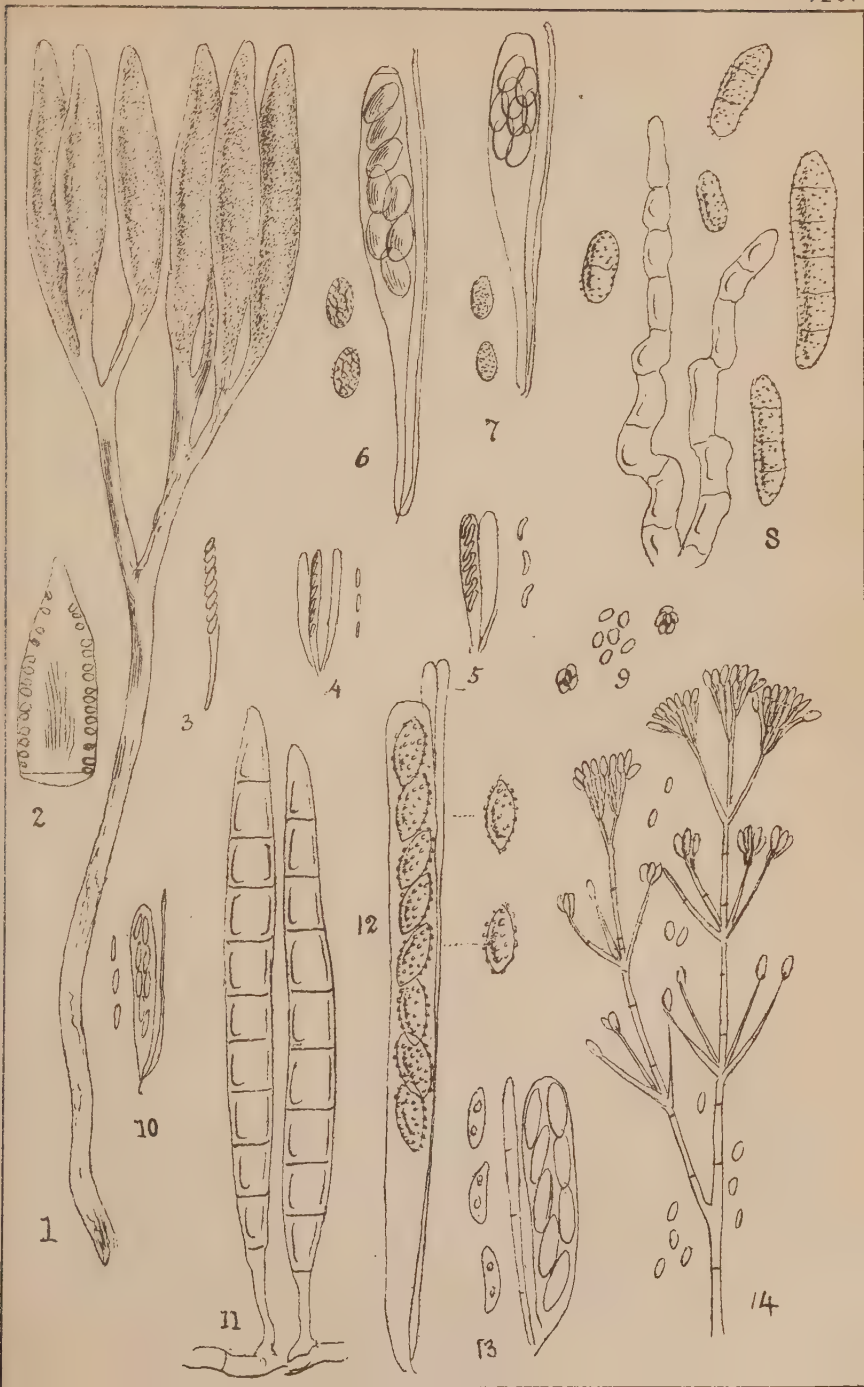
Spots orbicular, brown; perithecia dark brown, flattened, with an apical pore; spores minute, linear, about ·01 min. long.

**Diplodia Catappæ.** *Cooke.*

Peritheciis globosis, primo tectis, dein erumpentibus; sporis variabilis, demum septatis, atro brunneis, utrinque subnucleatis.

On nuts of *Terminalia Catappa*. Pondicherry (1862).

The perithecia are soon erumpent. Spores very variable in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shape and size, becoming uniseptate and dark brown, at first with a globose nucleus in each cell.

**Hendersonia Loniceræ.** *Cooke.*

Peritheciis gregariis, minutis, primo tectis, atris; sporis ovatis, oblongisve, brunneis, endochromatis 2-3 divisis.

On twigs of *Lonicera diversifolia*. Saharunpore (Dr. Jameson).

The perithecia are very minute. Spores not constricted at the septa, 2-3 partite.

**Pestalozzia palmarum.** *Cooke.*

Erumpens, atra, gregaria vel sparsa; pustulis sphæriæformibus; sporis fusiformibus quadriseptatis, pallide fuscis, triaristatis, stipite elongatis, hyalinis.

On dead sprout of cocoa-nut. Bengal (precise locality unknown). Jan., 1870.

Spores ·015 × ·005 m.m., fusiform, with 4-septa, pale brown, the ultimate cells hyaline, crested with three hyaline setæ.

**Ustilago pulveracea.** *Cooke.*

Pulverulenta, atrobrunnea; sporis globosis, granulatis vel subreticulatis, brunneis.

On male florets of *Zea Mays*. Lahore (Dr. J. L. Stewart).

Pulverulent, occupying the male florets, but very different in habit from *U. Maydis*. Spores globose, brown, rather large, with a granulated epispore, ·015 m.m. diam.

**Uromyces heterogenis.** *Cooke.*

Hypophylla. Soris dense aggregatis in maculis suborbicularibus, purpureo-brunneis; pseudosporis subglobosis, ovatis, obovatis, vel pyriformibus, variabilis, pallide fuscis, longe pedicellatis.

On leaves of *Hibiscus*. Kolapore, Bombay (Col. Julian Hobson).

The sori are densely aggregated in suborbicular patches, of a dark purplish-brown colour. Pseudospores very variable, subglobose, ovate or pear-shaped, ·01-·02 × ·017-·03 m.m., on very long slender peduncles ·06 m.m. long.

**Uromyces sphæropleum.** *Cooke.*

Hypophylla. Soris parvis, sparsis, orbicularibus, atro-brunneis; pseudosporis globosis, subopacis, longe pedicellatis.

On leaves, apparently of *Ononis*. Kolapore, Bombay (Col. Julian Hobson).

The sori are minute and scattered; pseudospores globose, rather opaque, dark brown, ·017-·022 m.m. diam., on long slender pedicels, ·05 m.m. long. The dark globose opaque spores are very peculiar, resembling those of *Pileolaria*.

**Uromyces Hobsoni.** *Vyse.*

Caulicola. Soris irregularibus, in tuberculis magnis, sclerotiformibus collectis, rubro-brunneis; pseudosporis compactis, oblongis, longe pedicellatis.—*Rev. J. E. Vize, in litt.*

On stems of *Jasminum*. Kolapore, Bombay (Col. Julian Hobson).

Forming compact bullate pustules on the stems, with the appear-

ance of reddish-brown sclerotia; pseudospores compact, oblong, brown, on long hyaline pedicels.

**Puccinia Kurdistani.** *Cooke.*

Hypophylla. Soris in maculis suborbicularibus, aggregatis; pseudosporis magnis, elongato-ellipticis, leniter constrictis, fuscis, breviter pedicellatis.

On *Taraxacum glaucum.* Koordistan.

Sori collected in suborbicular spots in a manner similar to those of *P. glomerata;* pseudospores large, elongated, elliptical, slightly constricted at the septum, brown, ·05 × ·025, much larger than in *P. glomerata, P. chondrillæ* and allied species.

**Puccinia rostrata.** *Cooke.*

Published in "Grevillea" iii., p. 75, under the name of *P. cruciferarum;* but as that was previously appropriated by Rudolphi, the present name must be substituted.

On *Cruciferæ.* Himalayas.

**Hemileia vastatrix.** *B. & Br.* "Gardener's Chronicle," Nov. 6, 1869, with fig.

On coffee leaves. Mysore.

This pest was first described from specimens communicated from Ceylon. Although less destructive to the coffee plantations in Mysore, it has now established itself on the Continent of India.

**Isaria stellata.** *Cooke.*

Nivea, stellata, incrustans. Floccis tenuissimis, circinatis.

Encrusting dead insects attached to the under surface of mango leaves. Mysore.

Snow white, encrusting minute insects, and assuming the appearance of stellate bodies, about 1 line in width. Threads very delicate circinate, sigmoid or variedly curved. (Spores not seen.)

**Pelliculaxia.** *Gen. Nov.*

Parasitica. Floccis repentibus ramosis, septatis, in pelliculam sub-gelatinosam intertextis. Sporis sessilibus, simplicibus, hyalinis.

Hab. On living plants.

**Pelliculaxia koleroga.** *Cooke.*

Hypophylla, effusa, griseo-alba, sporis globosis, hyalinis, echinulatis.

On under surface of leaves of *Coffea arabica.* Mysore.

Effused in large greyish white patches, sometimes nearly covering the under surface of the leaves; threads creeping, branched, septate, interwoven into a subgelatinous pellicle, which can be stripped from the leaf when moist. Spores sessile, scattered over the threads, globose, hyaline, echinulate ·0075 m.m. diam. Very destructive in coffee plantations, where it is known under the name of "Kole-roga," or black rot. Probably allied to *Amphiblistrum.* Corda.

**Clasterisporium maculatum.** *Cooke.*

Epiphylla. Maculis orbicularibus, velutinis; sporis fasciculatis, arcte clavatis, ad basim attenuatis, supra atro-brunneis, inferne hyalinis, multiseptatis.

On leaves of *Ficus cordifolia.* Kolapore, Bombay (Col. Julian Hobson).

Forming orbicular spots $\frac{1}{4}$ inch broad. Spores fasciculate, narrowly clavate, ·08 × ·006 m.m., dark brown above, hyaline below, seated on the creeping mycelium, with from 7-9 septa, which at length become obscure. Clearly congeneric with *Clasterisporium caricinum*, Schw.

**Glenospora didyma.** *Cooke.*

Epiphylla. Maculis atris, irregularibus, subconfluentibus; floccis repentibus, ramosis, divaricatis, lateraliter papillatis; sporis ellipticis, brunneis, endochromate bipartitis.

On fading leaves of some undetermined plant. Kolapore, Bombay (Col. Julian Hobson).

Forming irregular black patches on the upper surface of the leaves. Threads creeping, brown, branched, divaricate, with lateral papillæ, to which the spores are attached; spores elliptical, ·016-·018 × ·009 m.m., brown; endochrome bipartite.

In the original diagnosis of this genus the spores are characterized as globose; but the Rev. M. J. Berkeley does not regard this as an essential character of his genus, which will have to be modified accordingly, as all the features of the present species indicate its close affinity with *Glenospora melioloides*, B. & Curt.; even to the curious discoid bodies composed of radiating flocci, the relation of which to the creeping threads has not yet been accurately determined. Probably they are the early stages of the sporiferous threads.

**Dothidea perisporioides.** *Berk. & Curt.* "North American Fungi," *Grevillea* iv.

On leaves of some leguminous plant. Bombay (Col. Julian Hobson).

Sporidia brown, uniseptate, constricted, each extremity attenuated.

**Chætomium Indicum.** *Corda.*

On paper. Burmah.

**Eurotium herbariorum.** *Link.*

Common, on various substances. Bengal. Chittagong. Burmah.

**Capnodium mangiferum.** *C. & Broome.*

Effusum, velutinum; peridiis ovatis pyriformibus vel lageniformibus; sporidiis arcte ellipticis, hyalinis, uniseptatis.

On leaves of *Mangifera Indica.* Mysore.

Effused, forming a velvety stratum on both surfaces of the leaves. Peridia ovate or pear-shaped, or flask-shaped ·075-·08 m.m. long; sporidia hyaline, uniseptate about ·0125-·015 m.m. long.

## DESCRIPTION OF PLATE LXIII.

Fig. 1. Threads and spores of *Pellicularia Koleroga* × 500.
„ 2. Portion of thread and spores further magnified.
„ 3. Pseudospores of *Uromyces sphæropleum* × 500.
„ 4. Pseudospores of *Uromyces heterogenum* × 500.
„ 5. Spores of *Ustilago pulveracea* × 500.
„ 6. Pseudospores of *Puccinia Kurdistani* × 500.
„ 7. Pseudospores of *Puccinia rostrata* × 500.
„ 8. Portion of stem with sori of *Uromyces Hobsoni*.
„ 9. Pseudospores of *Uromyces Hobsoni* × 500.
„ 10. Spores of *Clasterisporium maculatum* × 500.
„ 11. Threads and spores of *Glenospora didyma* × 500.
„ 12. Discoid body accompanying the threads of *Glenospora* × 500.
„ 13. Conidia and peridium of *Capnodium Mangiferum* × 500.
„ 14. Asci and sporidia of same × 500.
„ 15. Free sporidia of *Capnodium mangiferum* × 500.

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# NEW AND RARE BRITISH FUNGI.

*By* Wm. Phillips and Charles B. Plowright.

[*Continued from Vol. III., p.* 126, *with plate* 62.]

31. **Hygrophorus mucronellus.** *Fr. Hymen. Europ. p.* 418. *Fr. Ep. p.* 331.

Fragile, pileus submembranaceus, conico-campanulate, acute, smooth, bright-red, becoming pale, stem fistulose, thin fibrous, somewhat silky, base white, gills decurrent, triangular, thick, yellow.

In a grass field by the sea bank. Kings Lynn. Dec., 1875, in company with *H. russo-coriaceus*. Probably not uncommon.

32. **Paxillus paradoxus.** (*Kalchb.*) *Berk. Kalchb. Fung. Hung. t.* 16, *fig.* 1.

Spores ·0006 × ·0002 in., with a nucleus at each end.

The Rev. M. J. Berkeley considers this a *Paxillus*. Wrekin, Salop, Sept., 1875.

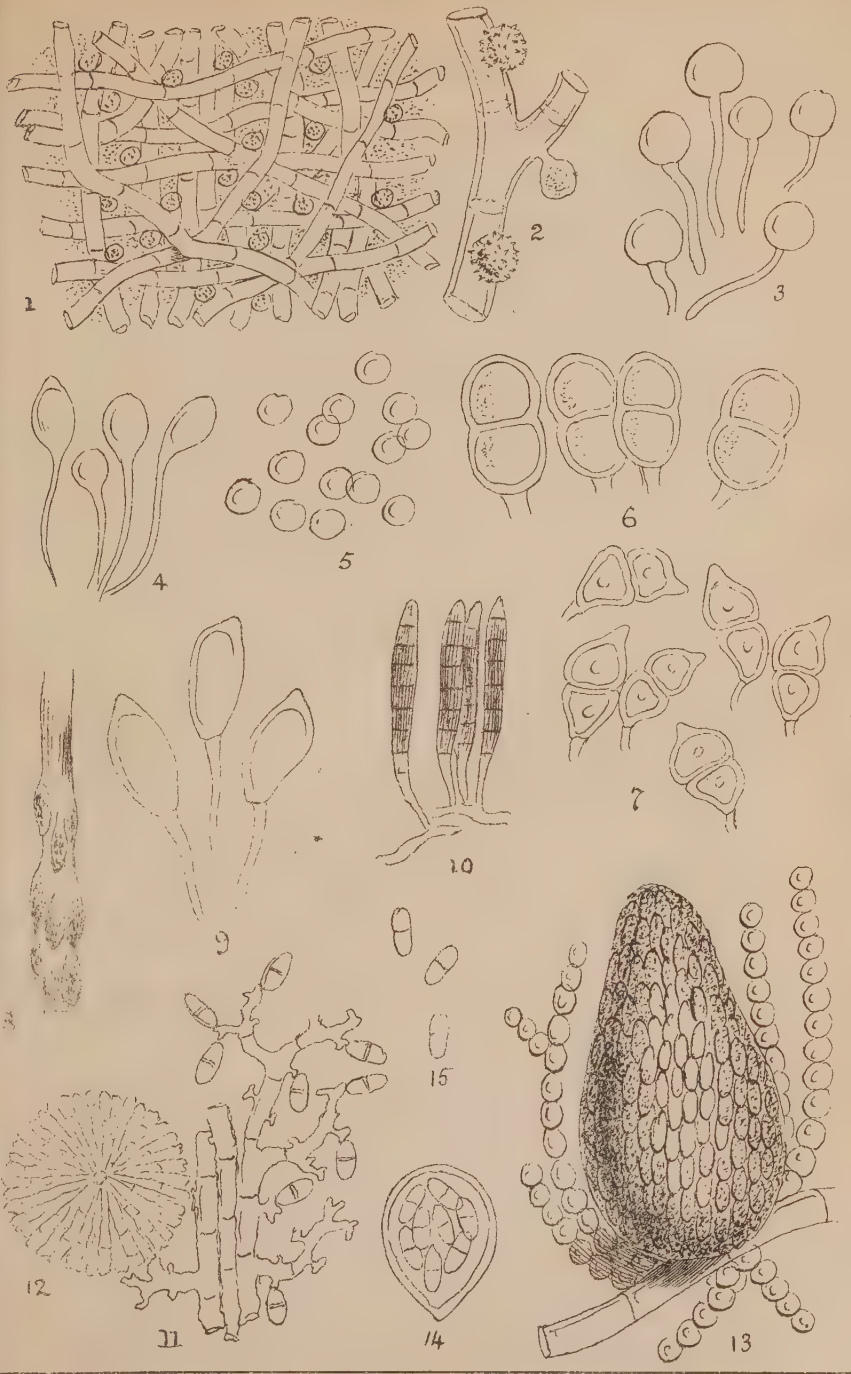
* **Sistotrema confluens.** *Pers.*

A curious and interesting form of this plant occurred at Hereford this year, it was for the most part stemless, incrusting sticks, leaves, fragments of earth, etc., extending into the holes made by the burrowing of some animal, either a mole or a rat, some of the best developed specimens growing subterraneously upon the roof of the burrows.

33. **Stereum pini.** *Fr. Hymen. Europ. p.* 643. *Fr. Ep. p.* 553.

Resupinate coriaceo-cartilaginous peltato-adnate submarginate, smooth beneath, pallid, at length bullate, hymenium purple, flesh-coloured, then brownish, pruinose.

Growing upon the under side of dead branches of *Pinus*




INDIAN FUNGI

*sylvestris*, while they were still attached to the tree. North Wootton.

34. **Corticium typhæ** *Fckl. Symbol. Mycol. p.* 27. Athelia typhæ, *Pers. Mycol. Europ. p.* 84.

Longitudinally effused, thin, then quite smooth, very pale tan-coloured.

On *Typha latifolia*. North Wootton, 1874.

Almost invisible when dry.

* **Solenia fasciculata.** *Fr.*

This occurred on dead Salix, near Shrewsbury, Jan., 1876.

* **Phallus iosmos.** *Berk.*

This plant occurred abundantly on the sand hills by the sea shore at Scratby, near Yarmouth, in November, 1874, from whence the Rev. Kirby Trimmer kindly sent us specimens; after a very careful examination we were unable to differentiate these specimens from various forms of *P. impudicus* we have met with either by habit, colour, or odour; one specimen only had a reddish tinge upon the stem, several of the older ones were blackened by some *Cladosporium*. Mr. Trimmer, however, says—"I have had the opportunity of testifying to the appropriateness of the specific name of 'iosmos,' though, in the midst of these specimens, I found them by sight and not by scent. In getting them up from the sand, they yielded a pleasant violet odour, and it was not until the third day after gathering that they became offensive." Rev. M. J. Berkeley, to whom specimens were sent, says, "doubtless the plant of *Curtis' Entomology*, but it is very doubtful whether it is a species."

35. **Dinemasporium fimeti.** *n. sp.*

Excipulum subrotund, superficial, black. Spores appendiculate, ·0003 exclusive of appendage. Smaller and more compact than *D. graminum*, Lèv., with much smaller spores.

On rabbits' dung. Kings Lynn, 1874.

Pl. 62 fig. 1. Spores.

36. **Excipula petiolicola.** *Fckl. Symb. Mycol. p.* 400.

Perithecia scattered, minute, hemispherical or oblong; black, cup-shaped when dry.

On the petioles of Tilia. Ringstead, Ap., 1872.

37. **Torula pinophila.** *Chev. Rabh. F. E., No.* 1668. *Cooke's Fung. Brit. 2nd edit. fas. IV. No.* 335.

On *Abies pectinata*. Dolgelly, North Wales. June, 1875.

38. **Gymnosporium Physciæ.** *Kalchbr. Szep. Gomb. Jeb. No.* 856.

On the apothecia of *Physcia parietina*. Common about King's Lynn, but we have never seen it upon any other lichen.

39. **Puccinia acuminata.** *Fckl. Symb. Mycol. p.* 55.

On *Galium saxatile*. Montgomeryshire. Rev. J. E. Vize.

40. **Uromyces Betæ.** *Kühn in Bot. Zeitg.* 1869, *sp.* 540. *Fuckel. Symb. Mycol.* 64.

On *Beta vulgaris*, doubtless the advanced condition of *Tricho-*

*basis betæ*, Lèv., from which it may readily be distinguished by the naked eye from the darker colour of its pustules.

Kings Lynn, October, 1875.

41. **Fusidium cylindricum.** *Corda Fuckel Symb. Mycol. p.* 371.

On green but fading leaves of *Lapsana communis*, Mr. T. Brittain, 1875. Agreeing with Continental specimens from Dr. Geo. Winter, etc.

42. **Fusisporium Kühnii.** *Fckl. Symb. Mycol. p.* 371.

Mycelium arachnoid, white, effused. Hypha thin, branched, septate, matted, then vanishing ; conidia in little heaps, subregular, lunate, uniseptate, hyaline.

Overrunning mosses, lichens, etc., on the bark of trees, frequently about Kings Lynn, but by no means always in a fruitful condition.

43. **Ramularia variabilis.** *Fckl. Symb. Mycol. p.* 361.

Cæspitose, spreading, thin, white, on a brownish or greenish spot. Hypha fasciculate, flexuous, very short; conidia hyaline, very various, ovate, obovate, elliptical or cylindrical.

On fading leaves of *Digitalis purpurea*. Mr. T. Brittain.

44. **Vibrissia Guernisaci.** *Cr. Ann. des Sc. Nat. Vol. vii.*, 1857, *c. i.*

Very small, 1-3 millm. in diameter, sessile, gelatinous, lentiform or turbinate, slightly brown beneath; hymenium plane or convex, white, greenish-yellow or ochery-yellow, pale grey or bluish-grey; asci usually straight, containing 8 uncoloured sporidia, which are long, filiform, curved, much attenuated, and excessively slender; paraphyses numerous, articulated, presenting one to three chain-like bifurcations, the terminal cells being round or pear-shaped, and larger than the others ; sporidia about ·0038 in. long.

On the inner side of dead bark of willow. Shrewsbury. Nov., 1875.

45. **Peziza (Humaria) semi-immersa.** *Karst. Myc. Fenn.* I., *p.* 45. *Phillips, El. Brit., No.* 60.

Sub-gregarious, sessile, half immersed in the earth, at first subsphærical, then hemisphærical, at length expanded, applanate, very slightly pubescent, or becoming glabrous; margin crenulato-unequal, pallid, ochraceous, or incarnato-testaceous, epithecium darker; asci cylindracio-clavate; sporidia ellipsoid, one or two nucleate, ·016-·024 × ·09-·011 m.m. ; paraphyses articulated; apices curved and unequal.

On damp earth. Shrewsbury.

* **Peziza (Sarcoscyphæ) melastoma.** *Sow.*

A single specimen was found at Whitfield, near Hereford, in May, 1875.

* **Peziza (Sarcoscyphæ) sepulta.** *Fr.*

Terrington, St. Clements, Norfolk (C. B. P.). Nov., 1874.

46. **Peziza (Dasyscyphæ) palearum.** *Desm. Ann. Sc. Nat.* 1846. *Crypt de Fr. Exs. ii., No.* 917. *Phillips, El. Brit., No.* 68.

Minute, scattered, stipitate, whitish-tawny, acetabuliform, then plane, externally furfuraceo-tomentose, ciliated round the margin; disc ivory; stipes rather long, dark brown at the base; asci small, cylindrical; paraphyses large, acute at the summits; sporidia ·01-·013 × ·002 m.m.

On straw. King's Lynn (C. B. P.). On *Psamma arenaria.* Towyn, North Wales. June, 1875.

47. **Peziza (Dasyscypha) luzulina.** *Phillips. Grevillea, Vol. iv., pl.* 51. *fig.* 266.

Gregarious or scattered, shortly stipitate, minute, white, pubescent; disc pale yellow, plane, margined; asci clavate; sporidia 8, fusiform, straight or slightly curved, ·0005-·0008 × ·0002-·00025 in.; paraphyses linear.

At the base of dead leaves of *Luzulina sylvatica.* Conway, North Wales.

48. **Peziza (Dasyscypha) friabilis.** n.s.

Scattered or congregated, sessile, when young globose, then hemisphærical, externally whitish, minutely pubescent, concave, brittle; margin fractured, uneven; disc testaceous; asci cylindraceo-clavate; sporidia 8, filiform, ·06 × ·001 m.m., multiseptate; paraphyses slender.

On dead oak branches, growing on the woody fibre only. Dolgelly, North Wales. June, 1875.

Plate 62, fig. ii.—1, natural size of plant; 2, a cup magnified; 3, asci and paraphyses; 4, sporidia.

49. **Peziza (Dasyscyphæ) flammea.** *A. & S. Consp. p.* 319, *t.* 11, *f.* 7. *Phillips, El. Brit., No.* 72.

Gregarious or scattered, sessile, hemisphærical, strigoso-villous, dull red throughout; sporidia oblong, simple or spuriously uniseptate, ·01-·016 × ·0025-·0035 m.m.; paraphyses slender.

On *Salix aurita.* Aviemore, N.B. (Rev. J. Keith).

50. **Peziza (Dasyscypha) miliaris.** *Wallr.*

Sessile, scattered, minute, becoming pallid, externally thinly pruinose, immarginate, same colour as the disc, which becomes somewhat convex; asci clavato-cylindrical, ·002 × ·0003 in.; sporidia 8, oblong-ovate, ·0004 × ·00015 in.

On the upper side of *Peltigera canina.* North Wootton. Nov. 15, 1875.

* **Peziza (Tapesia) Bloxami.** *B. & Br.*

On dead wood. Near Barmouth, North Wales. June, 1875.

We were unable to find fruit in our specimen, and are indebted to Dr. Cooke for confirming our determination.

51. **Peziza (Mollisea) litoralis.** n.s.

Sessile, scattered or crowded, minute, black; disc dark brown, concave; margin incurved, fractured; asci subclavate; paraphyses

linear; sporidia cylindrical, narrow, enucleate, straight, or slightly bent, ·025 × ·002 m.m.

On dead wood washed up from the Loch. Lynwilg, Scotland (Rev. J. Keith).

Plate 62, fig. iv.—1, natural size of plant; 2, cups magnified; 3, asci and paraphyses; 4, sporidia.

52. **Peziza (Mollisea) maura.** n.s.

Scattered, sessile, at first globose, becoming patellate, sooty-black; margin raised, crenulate; asci clavate, elongated, and narrow below; paraphyses curved at the summits; sporidia narrowly fusiform, with five to seven nuclei, ·03-·038 × ·005-·006 m.m.

On dead wood. Dinmore, Hereford. Oct., 1875.

Plate 62, fig. iii.—1, natural size of plant; 2, cups enlarged; 3, cells of exterior of cup × same as sporidia; 4, asci and paraphyses; 5, sporidia.

53. **Peziza (Mollisea) retrusa.** n.s.

Minute, scattered, at first concealed by the epidermis, then erumpent, sessile, hemisphærical, or oblong, straw-coloured, smooth; asci clavate; sporidia eight, biseriate, oblong-ellipsoid, ·017-·019 × ·005-·006 m.m.; paraphyses not visible.

On needles of larch. Trefriw, North Wales. May, 1874.

When dry this is found with difficulty, as it becomes contracted, and conceals itself under a kind of lid formed of the ruptured epidermis; but when moist it is sufficiently conspicuous under a pocket lens. It should stand near *Peziza erumpens*, Grev.

Plate 62, fig. vi.—1, natural size of *P. retrusa*; 2, the same, much enlarged; 3, ascus; 4, sporidia.

54. **Peziza (Mollisia) ulcerata.** n.s. *Phillips, El Brit., No.* 83.

Scattered, erumpent, stictieform, then patellate; margin fractured; disc dirty-orange; asci clavate, tetrasporous; paraphyses enlarged at the summits, simple or forked, often contorted; sporidia ovate, granular within, ·015 × ·008 m.m.

This is allied to *P. fusarioides*, Berk., and *P. assimilis*, C. & P.; but differs from both in the much larger sporidia, and having only four in each ascus.

On *Aster tripolium*. Kings Lynn (C. B. P.). Sept., 1875.

Plate 62, fig. v.—1, natural size of plant; 2, the same magnified; 3, asci and paraphyses; 4, sporidia.

Since the foregoing was in type, we have discovered that the same species is described by Berk. & Br. in Ann. Nat. Hist. as *Pez. Tripolii.*

55. **Peziza (Mollisia) arenevaga.** *Desm. Ann. Sc. Nat.* 1852. *Pl. Crypt. ii., No.* 517. *Phillips' El Brit., No.* 84.

Erumpent, minute, scattered, of a soft waxy consistency, glabrous, sessile, when young globose, then plane, externally tawny, with a somewhat tumid tawny elevated margin, which is black when dry; disc watery, nearly white, when dry brown; asci

clavate, subcylindrical, erect amongst simple paraphyses; sporidia eight, oblong-ovoid, hyaline, obtuse at the ends, ·015 × ·005-·01 m.m.

On *Psamma arenaria*. North Wales, 1874. Scotland (F. Currey, Esq.).

56. **Stictis seriata.** *Lib. Phillips, El Brit., No.* 100.

Cups innate, punctiform, orbicular, plane or but slightly concave, disposed in approximate series, rubro-fuscous; asci linear, including 6-8 globose, minute, hyaline sporidia.—*Fckl.*

On *Carex ampullacea*. Forres, North Britain (Rev. J. Keith).

* **Stictis lichenicola.** *Mont.*

The Rev. W. A. Leighton received specimens from Ireland of this doubtful *Stictis*, and kindly communicated them to us.

57. **Hypocrea contorta.** *Berk. & Curt.* Sphæria contorta, *Schweinitz Synopsis, p.* 194, *No.* 1224.*

Subrotund, fixed to the matrix by the central portion, spreading, becoming thin towards the margin, where it is free and variously lobed, dark olive-green externally, yellowish-white within; perithecia minute, globose, confined to the upper surface; asci ·003 in. long; sporidia, 16, sphærical, with a central nucleus, ·0002 in.

On a rotten oak stick. Foxley Woods. Oct., 1875.

A very interesting addition to our flora, and agreeing exactly with American specimens received from Mr. J. B. Ellis.

58. **Hypocreopsis pulchra.** *Winter. Hedwigia*, 1875, *p.* 26. *Sphæriacei Britannici Cent. ii., No.* 100.

Compound. Perithecia 1 to 3, immersed in the elliptical verrucæform, or irregular, fleshy, red stroma, which is covered on the surface by a reddish down; ostiola erumpent, darker; asci oblongo-ventricose, subsessile, 4 to 8 spored; sporidia crowded in the ascus, broadly elliptic, simple, hyaline, ·002 × ·0008 in.

Near Shrewsbury, on sheep dung, 1874; on cow and sheep dung, Terrington, St. Clements, 1875.

59. **Nectria peltigeræ.** *Ph. & Pl.*

*Nectriella carnea*, Fckl. Symb. Mycol. p. 176. *Cryptodiscus Lichenicola*, Ces. in Kl. Herb. Myc. ii., 523.

On the living thallus of *Peltigera canina*, in company with and usually following its conidia, *Illiosporium carneum*, Fr. Castle Rising, Nov., 1875.

Fuckel is undoubtedly right in classing this plant with the *Nectrieæ*, both on account of the perithecium and also by reason of the fruit.

60. **Sphæria (Sordaria) merdaria.** *Fr. Fr. Elench. ii. p.* 100.

*Coprolepa merdaria*, Fckl. Symb. Mycol. p. 240. *Sordaria merdaria*, Winter. Sord. p. 13, t. 7. f. 1. Sphæriacei Brit. ii. No. 56.

Perithecia single or in groups of 2 or 3, surrounded by a stroma, which is black, shining, and semi-immersed in the matrix;

perithecia rugulose, dark brownish-black, shortly conical; ostiola obtuse; asci elongato-cylindrical; sporidia 8 ovate, simple, or with a nucleus, opaque, black, surrounded by gelatin, ·001 × ·0004 in.

On horse dung, Terrington St. Clements, 1874. On rabbits' dung, Kings Lynn, 1875.

61. **Sphæria (Sordaria) Equorum.** *Winter. Sord. p.* 13, *t.* 7. *fig.* 2. *Coprolepa Equorum*, Fckl. Symb. Mycol. p. 240. Sphæriacei Britannici ii. No. 57. Cooke Fungi, Britt. ii., 241-2.

Perithecia scattered, in a thin subcoriaceous crust-like stroma on the surface of the matrix, covered with a dark brown villosity; ostiola black, somewhat conical; asci cylindrical, octosporous; sporidia uniseriate, ovate, or oblong, black, simple, surrounded by a gelatinous envelope, ·0007 × ·0003 in.

On horse dung. North Wootton, Shrewsbury.

Grevillea vol. iii., t. 42, fig. 7.—*a*, section of fungus enlarged; *b*, sporidia; *c*, ascus and paraphysis.

62 **Sphæria parmeliarum.** n. sp.

Superficial perithecia, small, black, crowded, somewhat shining, smooth; ostiola minute but distinct, papillæform; sporidia eight, triseptate, elongated, somewhat constricted, pale brown, usually uniseriate, rarely 4-septate, ·001 × ·0005 in.

Growing parasitically upon *Parmelia saxatilis*, on a living spruce fir tree, Dolgelly, North Wales. June 22, 1875 (Rev. W. A. Leighton).

Plate 62, fig. viii.—1, natural size; 2, asci; 3, sporidia.

63. **Sphæria (Diaporthe) resecans.** *Nke. Nitschke Pyren. Germ. p.* 314. *Sphæriacei Brit. ii., No.* 43.

Elongated, bursting through the bark longitudinally; perithecia, minute, globose, or slightly depressed; ostiola very small, short; asci clavate or oblong, octosporous; sporidia biseriate, obtusely fusiform, straight, hyaline, bipartite, 2-4 septate, somewhat constricted, ·0004 in. × ·0001 in.

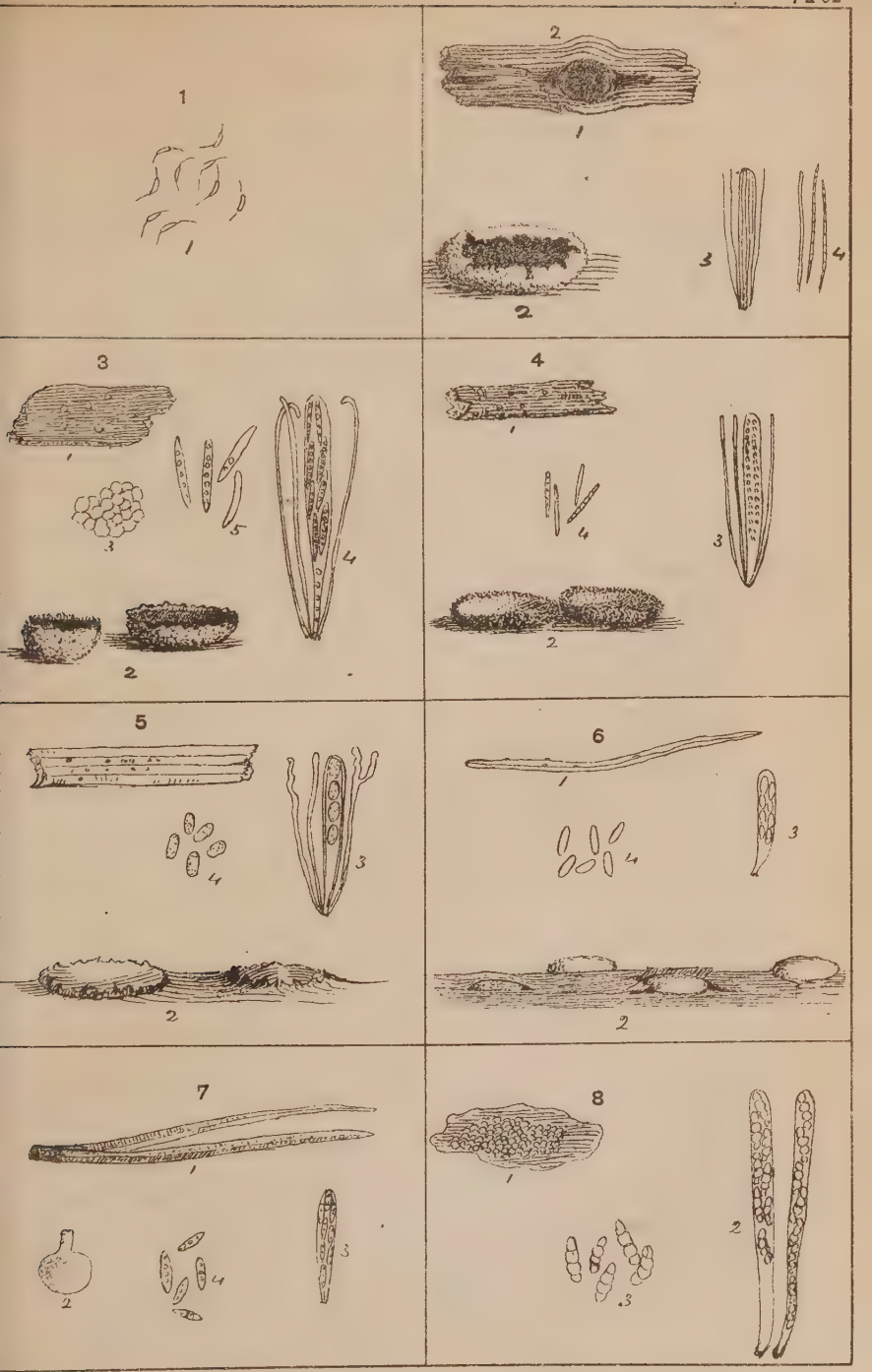
On *Syringa vulgaris*. Terrington St. Clements, 1874.

64. **Sphæria (Diaporthe) pinophylla.** n. sp.

Perithecia scattered, sometimes two or three in a group, seated beneath a widespreading black crust, immersed in the matrix; ostiola elongated, abruptly truncate at the apex; asci ·001 in. long; sporidia biseriate, hyaline, acute, quadrinucleate, then uniseptate, ·007 × ·0002 in.

On decaying fir needles (*Pinus sylvestris*), Belmont, Hereford. May, 1875.

Plate 62, fig. vii.—1, natural size; 2, a perithecium magnified; 3, ascus; 4, sporidia.




BRITISH FUNGI

## ON PEZIZA BRUNNEA, *A. & S.*

*By* M. C. Cooke.

It is very difficult to determine with accuracy many of the species of fungi described by old authors in the absence of authentic specimens. When specific characters depend nearly entirely on microscopic features, the difficulty becomes almost an impossibility. Since the species of *Peziza* have been subjected to microscopical examination, the limits of species have been more clearly defined, and it is by no means unusual to find that two or three forms, greatly resembling each other in external features, but widely different in fruit, have been confounded together under one name. An instance of this kind we had occasion to point out a short time since in the case of *Peziza calycina*, and now a difficulty presents itself as to the *Peziza brunnea*, Alb. & Schw.

In this instance we have a *Peziza* belonging to the group *Sarcoscypha* and a close ally of *Peziza hemispherica*, but much smaller. A careful perusal of the description given in the Conspectus, combined with the coloured figure, will convey a pretty accurate idea of the external features of this *Peziza*. It is from one to three lines broad, of an elegant brown colour, clad externally with scattered fascicles of hairs, but not truly ciliate, of a cæspitose habit, expanded when mature, with the margin inflexed. For a long time, and by many authors, a small *Peziza* has been referred to this species, which Dr. Rehm has called *Peziza gregaria*, and Dr. Nylander *Peziza hemisphærica* var. *minor*. Doubtless it was this which was published by Desmazieres (No. 1312) as *Peziza brunnea*, and since then many have followed his example. It was this form which we had in view as *Peziza brunnea* when the "Handbook of British Fungi" was written.

There are some features in which the above-named species corresponds with the *Peziza brunnea*, A. & S.; but sufficient attention was not paid to their figure, which has a brown hymenium, and, also, to that important phrase in the description, "unicolor, eleganter brunnea," whereas, in the *Peziza gregaria*, Rehm, the disc is of a livid or pale watery grey, and not in the least brown. At a period when the colour of the disc in *Peziza* was regarded as alone of specific value, it would not have been possible for Schweinitz to have described and figured a species with a brown disc, when it really had a pallid one. Hence we cannot regard the *Peziza gregaria*, Rehm, as the *Peziza brunnea*, A. & S

It is very probable that the *Peziza proximella*, Karst. (Monogr. p. 125), *Peziza hæmispherica* var. *β*, *proximella*, Karst. (Myc. Fenn. p. 69), is the same as the *Peziza brunnea*, Desm. (not A. & S.), and the *Peziza gregaria*, Rehm, A comparison of the figure given by Sowerby (pl. 369, fig. 1) as *Peziza hybrida* will be found to correspond with Alb. & Schw. figure of *Peziza brunnea*, and not with *Peziza gregaria*.

Recently another *Peziza* has been referred to *Peziza brunnea*, A. & S., with some greater reason, since it has a bright clear brown disc, and is about the same size as that indicated in the "Conspectus." It is this which Dr. Nylander (Observ. p. 21) names *Peziza brunnea;* and also Karsten (Myc. Fenn, p. 75), with spherical sporidia from ·013-·017 m.m. diameter. We received the same species from the United States, and applied thereto the name of *Peziza confusa* (U.S. Discomycetes), under the impression that there was no evidence to show that this species was known to Albertini and Schweinitz, or that it exists in any old collection, or has been met with at all until very recently. Although in colour this species approaches the figure given in the "Conspectus," this feature cannot be accepted alone; for we have received from Hungary, through the kindness of Professor Hazslinzzky, a brown terrestrial *Peziza* under the name of *Peziza brunnea*, which has elliptical sporidia, somewhat incurved margin, but not distinctly hairy externally, and much smaller than 1-3 lines.

Until more distinct evidence can be afforded of the identity of Karsten's species with that described by Albertini and Schweinitz, we deem it much more consistent to retain the name of *Peziza confusa*, which we applied to it provisionally, than to take for granted that it is the true *P. brunnea* of which we still have grave doubts. As far as we are aware no brown hairy *Peziza* corresponding with Sowerby's figure has been found in Britain since his time. The nearest approach to it is a pale condition of *Peziza umbrorum*, which is sometimes found with a flesh-coloured disc. Hitherto we do not find that *Peziza confusa* has been recorded at all in the west of Europe, or any where near where the *Peziza brunnea*, Alb. & Schw., was found and figured.

We are, therefore, content to hold the true *Peziza brunnea* in abeyance, and not to accept any of the species which have been referred to it in recent times, in the hope that some more conclusive evidence will be forthcoming in the future to identify and establish this lost species.

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## LICHEN PILULARIS, Dav.

Can any lichenist inform me what this lichen really is? The Hook. Herb. at Kew has two specimens under this name, which once belonged to Dr. Withering. One of them, which externally admirably resembles the fig. of *L. pilularis*, in "Linn. Trans.," Vol. ii, p, 283, tab. 28, fig. 1, proved, on microscopic examination, to be undoubtedly *Lecidea contigua*, Fr., and the other as certainly to be *Trachylia tympanella*, Fr. The genuine *L. pilularis*, Dav., remains yet to be deciphered. Is the Rev. Hugh Davis's herbarium in existence; and, if so, where preserved?

W. A. Leighton.

# NEW BRITISH FUNGI.

(*Continued from p.* 114.)

The following enumeration will include the species recently published by Messrs. Berkeley and Broome:—

**Agaricus (Armillaria) bulbiger.** *A. & S. Fries Epic. p.* 40.†
Pileus fleshy, convex, then expanded, obtuse, even; stem stuffed, equal, marginate bulbous, pallid, fibrillose, ring oblique, fugacious, gills emarginate, pallid.—*Fries Icon. t.* 26, *f.* 2. *Klotsch, Flor. Bor., t.* 373. *Berk. & Br. Ann. N.H., No.* 1501.

In pine woods. Hereford. Oct.

Bulb very distinct. Pileus grey, rufescent, or pallid, at first fibrillose, then naked, soft.

**Agaricus (Armillaria) robustus.** *A. & S. Fries Epic.*, 41.
Pileus fleshy, compact, convexo-plane, unequal, smooth, margin and stem solid, short, attenuated downwards, rooting, fibrillose above the ring, white below, gills emarginate, attached, whitish.—*Berk. & Br. Ann. No.* 1502.

In woods. Rannoch.

Flesh very firm. Taste and smell exactly that of *Polyporus squamosus*.

**Agaricus (Tricholoma) loricatus.** *Fries. Ep. p.* 60.
Cartiliginous, tough; pileus campanulate, then convex, somewhat undulated, rather inclined to be viscid when moist, subpapillose, cuticle distinct, horny, stem somewhat hollow, equal, rooting, striato-fibrillose; gills attenuated, then free, crowded, pallid. —*Fries Icon. t.* 35, *f.* 2. *Berk. & Br. Ann., N.H. No.* 1503.

In woods. Glamis.

Viscid. Remarkable for the thick coat of the pileus. Pileus 1-2 in. broad; stem 2-3 in. long. Odour nauseous.

**Agaricus (Tricholoma) virgatus.** *Fries Ep. p.* 62. *Icon. t.* 34, *f.* 1.
Rigid; pileus fleshy, convexo-plane, somewhat umbonate, very dry, becoming smooth, streaked with innate black lines and scales, margin at first naked; stem solid, stout, striate, smooth, white; gills emarginate, crowded, becoming greyish.—*Berk. & Br. Ann. N. H., No.* 1504.

In woods. Forres.

Solitary, large. Pileus cinereous.

**Agaricus (Tricholoma) leucocephalus.** *Fr. Ep. p.* 71. *Icon. t.* 43., *f.* 2.
Wholly white; pileus fleshy, thin, convex, then plane, even, moist, veil silky, evanescent, smooth, margin patent, naked; stem hollow, cartilaginous, tough, rooting, even, smooth; gills rounded behind, free, crowded.—*Berk. & Br. An. N. H., No.* 1505.

On the ground. Bowood. Oct.

Odour strong of fresh meal.

**Agaricus (Tricholoma) militaris.** *Lasch. Fr. Ep. p* 71.

Pileus compact, flexuous, becoming smooth, viscid, cinnamon; margin even; stem solid, squamulose, fibrillose, pallid, rather bulbous at the base; gills emarginate, somewhat crowded, whitish, at length with lurid spots and lacerated.—*Berk. & Br. Ann., N. H.*, 1506.

In woody places. Glamis.

Stem $4\frac{1}{2}$ in. long. Pileus 4-7 in. broad. Odour and taste unpleasant.

**Agaricus (Tricholoma) civilis.** *Fr. Ep. p.* 71.

Pileus fleshy, soft, convex, then plane, smooth, moist, ash-coloured, becoming pallid; cuticle separable; stem solid, soft, fragile, fibrillose or squamulose, whitish; gills deeply emarginate, crowded, white then yellowish, not spotted.—*Fries Icon. t.* 42, *f.* 1. *Berk. & Br. Ann., N. H., No.* 1507.

In pine woods. Epping. Oct.

**Agaricus (Clitocybe) subalutaceus.** *Batsch. Fr. Ep. p.* 84.

Yellowish, growing pallid; pileus fleshy, soft, convexo-plane or depressed, obtuse, unequal, smooth; stem stuffed, firm, elastic, naked; gills adnato-decurrent, broad, rather distant, becoming whiter. *Batsch, fig.* 194.—*Berk. & Br. Ann. N. H., No.* 1509.

Under *Ilex*. Oxton. Exeter. Nov.

Smell like that of *A. putridus* and *A. rancidus*, peculiar.

**Agaricus (Clitocybe) gilvus.** *P. Fr. Ep. p.* 95.

Pileus fleshy, compact, convex, then depressed, obtuse, smooth, moist; stem fleshy, solid, stout, smooth, nearly equal; gills decurrent, very much crowded, thin, branched, and as well as the flesh pallid, then ochraceous.—*Fl. Dan. t.* 1011. *Berk. & Br. Ann. N. H., No.* 1508.

In pine woods. West Farlegh.

Pileus scarcely infundibuliform.

**Agaricus (Clitocybe) splendens.** *Fr. Ep.* 96, *p. Icon. t.* 44, *f.* 1.

Solitary. Pileus somewhat fleshy, flatly infundibuliform, smooth, shining, ash-coloured, becoming yellowish; stem solid, smooth, of the same colour; gills deeply decurrent, crowded, simple, white. —*Berk. & Br. Ann N. H., No.* 1510.

In woods. Reading.

**Agaricus (Clitocybe) expallens.** *Fr. Ep. p.* 100.

Pileus between fleshy and membranaceous, flatly infundibuliform, even, smooth, becoming tawny, when dry clay-coloured, then whitish; margin scarcely expanded; stem stuffed, then hollow, equal, whitish, silky above; gills decurrent, rather distant, whitish grey.—*Berk. & Br. Ann. N. H. No.* 1511.

In woods. Glamis.

Smaller and paler than *Ag. cyathiformis*.

**Agaricus (Clitocybe) concavus.** *Scop. Fr. El. p.* 102. *Icon. t.* 57, *f.* 2.

Pileus submembranaceous, broadly and deeply umbilicate, even, flaccid, naked, hygrophanous, edge convexo-plane, undulated;

stem stuffed, equal, smooth, grey; gills decurrent, crowded, narrow, fuliginous.—*Berk. & Br. Ann. N.H*, *No.* 1512.

In pastures. Batheaston.

Pileus 1-2 in. long; stem 1-2 in. long, 1-2 lines thick, wholly soft, fibrous.

**Agaricus (Collybia) rancidus.** *Fr. Ep. p.* 125.

Strong scented. Pileus rather fleshy, convex, then plane, umbonate, even, tough, whitish, silky; stem fistulose, straight, rigid, rooting, smooth; gills free, crowded, narrow, cinereous.—*Fries Icon. t.* 69, *f.* 1. *Katchbr. t.* 6, *f.* 4. *Berk. & Br. Ann. N.H.*, *No.* 1513.

Under cedars. Burnham Beeches. Nov.

The smell is very peculiar; the gills very dark so as to be easily mistaken for those of a *Hebeloma*.

**Agaricus (Collybia) ventricosus.** *Bull t.* 411, *f.* 1. *Fr. Ep. p.* 120.

Pileus rather fleshy, campanulate-convex, umbonate, smooth; stem fistulose, even, naked, becoming rufescent, ventricose at the base, rooting; gills arcuate, affixed, ventricose, broad, rather crowded, undulated, rufescent.—*Berk. & Br. Ann. N.H.*, *No.* 1514.

In woods. Bathford. Oct.

**Agaricus (Omphalia) maurus.** *Fr. Ep. p.* 156.

Pileus somewhat membranaceous, convex, deeply umbilicate, smooth, striate, hygrophanous, even when dry, silky, shining; stem somewhat fistulose, thin, rigid, straight; gills truly decurrent, arcuate, very much crowded, white.—*Fries Icon. t.* 73, *f.* 2. *Berk. & Br. Ann. N.H.*, *No.* 1515.

On lawns. Coed Coch.

**Agaricus (Mycena) aurantio marginatus.** *Fr. Ep. p.* 131.

Pileus rather fleshy, campanulate, expanded, subumbonate, even; stem even, smooth, ventricose, strigose; gills attenuated behind, adnexed, greenish pallid, edge fringed with orange flocci.—*Flor. Dan. t.* 1292, *f.* 2. *Berk. & Br. N.H.*, *No.* 1516.

In pine woods. Perth. Nov.

Has a peculiar aspect, looking more like a *Marasmius* than a *Mycena*. Stem very brittle, fistulose; smell strong; margin striate.

**Agaricus (Mycena) excisus.** *Lasch. Fr. Icon. t.* 81, *f.* 1.

Pileus campanulate-convex; disc rather fleshy, subumbonate, rugulose; stem firm, tough, rooting, even, becoming tawny; gills ventricose, thick, distant, connected by veins, narrowed and incised behind, nearly free.—*Fries Epic. p.* 138. *Berk. & Br. N.H.*, *No.* 1517.

On trunks or on the ground. Glamis.

**Agaricus (Mycena) psammicola.** *B. & Br. Ann. N H.*, *No.* 1518.

Pileus subhemispherical, hygrophanous, sprinkled with minute particles; margin striate; stem short, solid, rooting, umber below, white above, wholly whitish-pulverulent; gills segmentoid, shortly adnate, sinuated behind; odour strong, but not nitrous.

On a sand bank, amongst moss. Addington. Sept.

Pileus 3 lines across, stem not 6 lines high, about ½ a line thick, firm; pileus brown, becoming paler towards the margin. A small but well-marked species.—*B. & Br.*

**Agaricus (Mycena) metatus.** *Fr. Ep.* 142.

Soft, strong-smelling; pileus submembranaceous, obtuse, striate, hygrophanous, even when dry, opaque, whitish; stem firm, even smooth, fibrillose at the base; gills adnate, thin, distinct, linear, whitish.—*Paul t.* 99, *f.* 8. *Berk. & Br. Ann. N.H., No.* 1519.

Amongst moss. Forres. Oct.

**Agaricus (Mycena) collariatus.** *Fr. Ep. p.* 146. *Icon. t.* 82, *f.* 5.

Pileus membranaceous, campanulate-convex, subumbonate, striate, becoming pale, smooth; stem filiform, thin, smooth, shining; gills adnate, with a collar, thin, crowded, distinct, whitish, or pale flesh-coloured.—*Berk. & Br. Ann. N.H., No.* 1520.

Amongst grass. Glamis. Addington.

Pileus ½ inch or more broad, tawny, or greyish.

**Agaricus (Mycena) debilis.** *Fr. Ep. p.* 145.

Tender. Pileus membranaceous, campanulate, convex, obtuse, striate, becoming even when dry, rugulose, brownish, opaque; stem filiform, capillary, lax, flaccid, fibrillose at the base; gills broadly adnate, distinct, whitish.—*Fries Icon. t.* 82, *f.* 4. *Bull* 518, *f.* P. *Berk. & Br. Ann. N.H., No.* 1521.

In a chestnut wood. Wrotham. Oct.

Colour whitish, flesh-coloured, livid, or tawny.

**Agaricus (Pleurotus) pulmonarius.** *Fr. Ep. p.* 176.

Horizontal. Pileus fleshy, soft, rather convex, obovate, or reniform, smooth; stem lateral, straight, very short, villous; gills plano-decurrent, simple, whitish, becoming livid.—*Fries Icon. t.* 87, *f.* 2. *Berk. & Br. Ann. N.H., No.* 1522. *Paulet. t.* 21.

On trunks. Aberdeen.

Pileus from greyish to tan-colour.

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## CARPOLOGY OF PEZIZA.

[*Plate* LXIX.]

ALEURIA.

Fig. 302. Peziza dochmia, *B. & C.*, ex. herb. M. J. B.
„ 303. P. euplecta, *C.* (P. phlebophora, *B. & C.* var.) ex. herb., M. J. B
„ 304. P. cœlopus, *Mont.*, in herb. Paris.
„ 305. P. Valenzuelæ, *B. & C.*, ex. herb. M. J. B.
„ 306. P. inæqualis, *B. & C.*, ex. herb. M. J. B.
„ 307. P. catinus, *Holms.*, in herb. Paris.
„ 308. P. micropus, *P.*, ex. herb. M. J. B.
„ 309. P. rapulum, *Bull*, ex. herb. M. J. B.
„ 310. P. ciborium, *Vahl.*, ex. Fries in herb. Berk.
„ 311. P. lechria, *B. & Br.*, ex. herb. M. J. B.
„ 312. P. Valenzueliana, *Mont.*, in herb. Paris.
„ 313. P. chrysopela, *C.*, Rav., No. 1492.
„ 314. P. nebulosa, *C.*, Rav., No. 812.

# OBSERVATIONS ON PEZIZA CALYCINA.

*By* M. C. Cooke.

The foregoing note by Dr. Rehm necessitates a few observations from us, *apropos* of the two species which he proposes to recognise, based on the variability of *Peziza calycina*.

It must be premised that extensive examinations have convinced us that some species of *Peziza* are much more variable than others, such for instance as *Peziza scutellata* and *Peziza calycina*. This, however, should cause us hesitation in constructing or accepting new species based on such variability.

Dr. Rehm proposes *Peziza laricis*, on what we consider an untenable basis, for reasons which we will presently detail. The grounds on which Dr. Rehm's proposition rests, are apparently three, viz.:—

1. Size and form of sporidia.
2. Texture of the asci.
3. Reaction with tincture of iodine.

*First.*—As to the size and form of the sporidia. However much a difference in size and form of sporidia may be valued in the determination of the limits of species, it is clear that these differences must be constant, and confined to the forms separated. In the two species indicated by our correspondent he describes the sporidia thus—

*P. calycina*. Sporidia elliptic, ·015-·018 × ·005 m.m.

*P. laricis*. Sporidia obtuse-elliptic, ·016-·018 × ·006-·007 m.m.

The differences, therefore, are simply that the sporidia in *P. laricis* are more obtuse, and broader than in *P. calycina*. If we accept the types of the two species which he gives, these will lead us to estimate the value of this distinction. These are—

*P. calycina*. Fungi Britt. i., 474, ii., 369, A. B.

*P. laricis*. Fckl. F. Rhen., 1206. Rehm Asc., 62. Thumen H. Œ. Myc., 191, Fungi Britt., ii., 370.

Attention must now be directed to our plate 66, containing figures of sporidia derived from these published specimens.

Fig. *a*, is from Fungi Britt., i., 474.
,, *d*, is from Fungi Britt., ii., 369 A.
,, *e*, is from Fungi Britt., ii., 369 B.

all of these are referred to *P. calycina*.

Fig. *b*, is from Fungi Britt., ii., 370.

We have no copy of Thumen's "Herb. Myc. Œcon.," hence have been unable to figure the sporidia in his No. 191.

In our specimens of Rehm's "Ascomyceten," the sporidia unfortunately are mostly granular, and unformed in the asci, being immature, so that we could obt in no figures of the mature sporidia, which appeared to be similar to those figured at *b*.

These figures are drawn by camera lucida from the sporidia, and

represent, in all cases, such free sporidia as presented themselves at the same time on the field of the microscope. These drawings have been reproduced by photo-lithography, on the plate, so that it may fairly be presumed that they are accurate delineations of the objects themselves.

From these figures it is evident that, as to width of the sporidia, there is no distinctive feature of difference between fig. *b* and the rest, nor in the obtusity of the extremities. The length of the sporidia are not taken into account in the characteristics of the proposed species.

We would contend that there is a much greater probability in favour of the form represented at fig. *c* being accepted as a distinct species than that at fig. *b*. The figure *c* is derived from the specimens mentioned in "Grevillea," iii., p. 121, as *P. calycina* var. *Trevelyani*. The division of the endochrome is a much more noteworthy feature in sporidia where nuclei are seldom observed, than difference in length or breadth, or obtusity of sporidia, when so great variability prevails.

The extreme variability in the length of the sporidia is remarkable in all forms of *Peziza calycina*. In fig. *a* we measured them respectively at ·014, ·015, ·02, ·023, ·025, ·026, ·028. In fig. *b*, ·015, ·016, ·018, ·022, ·024, ·026, ·028. In fig. *c*, ·018, ·02, ·022, ·024, ·028, ·03, ·032. It may be remarked here, that in all instances only one cup from the specimen named is concerned in the figures represented, so that there can be no admixture of sporidia from other and more or less matured cups.

For further comparison we have also given the following additional figures :—

Fig. *f*, from specimen collected at Ken Wood, near London, in which the sporidia are uniformly smaller.

Fig. *g* is from another of the specimens published in "Fungi Britannici" (ii., 370), regarded by Dr. Rehm as *Peziza laricis*.

Fig. *h*, two of the most mature asci in the only developed cup to be found on our specimen of *Peziza calycina*, in Fuckel's "Fungi Rhenani," No. 1206.

Fig. *i*, is from specimen named *P. calycina*, received from the late Dr. Curtis, of S. Carolina (U.S.), and which seems to be *P. lachnoderma*, Berk.

It may be remarked here, that a great number of the specimens referred to *P. calycina*, in Herbaria, are *P. subtilissima*, Cooke ("Grevillea," iii, fig. 167), as for instance, specimens we have received from Dr. Geo. Winter (Leipzic), H. W. Ravenel (S. Carolina), Prof. Hazslinszky (Eperies), A. Jerdon (Scotland), Fries's "Scler. Suec.," No. 360, Mougeot (in "Herb. Berk."), and *Peziza pulchella*, Grev., in "Herb. Edinensis." The *Peziza calycina*, of Nylander ("Obs.," p. 24) and of Karsten ("Myc. Fenn.," p. 154), is clearly the same species.

If it were admitted that the difference in width and obtusity of

sporidia existed in the forms indicated by Dr. Rehm, to the extent alleged, we do not consider such difference to be of specific value in a species where so much variation, even beyond the limits which he assigns, is manifest.

*Second.*—The texture of the asci is noted. In

*P. calycina.* "Asci tenues."

*P. laricis.* "Apex ascorum crassorum."

We must state that we fail to recognize this difference in the specimens examined.

*Third.*—Reaction with tincture of iodine.

*P. calycina – not* becoming blue.

*P. laricis*—becoming blue.

Whether this be so or not in fresh specimens, and under peculiar circumstances, we do not care to enquire, but, we contend that the iodine test is not trustworthy. We have found by experience that the same specimen which becomes tinted blue by iodine when in a fresh state, if allowed to dry for some time, and is again moistened, affords no appreciable change; that all cups manifestly belonging to the same species, such as *P. coccinea*, of which there can be no doubt, do not behave themselves in the same manner under treatment by iodine. And that change of colour produced by iodine is not infallible evidence of difference in species, but merely of different conditions under which certain individuals may have been developed. That, in fact, the conditions which induce change of colour on the application of solution of iodine to the asci, are the result of what may be termed accidental circumstances, and are not absolutely characteristic of specific forms.

Our friend, Mr. Phillips, who was at one time an advocate for iodine tests, has, we believe, lost faith in them entirely, as affording reliable evidence of identity or difference of species. We know of no one in this country who is in the habit of examining a larger number of specimens of *Peziza* than ourselves and Mr. Phillips, amounting to some hundreds of specimens in the year. We have been constantly in the habit of availing ourselves of his services to check and verify our own observations on the minute differences of closely allied species, in preparation of the figures for "Mycographia," and yet he never appeals to the iodine test as any conclusive argument in favour of any of his views.

Under all these circumstances, and for these reasons, we have thought it desirable at once to state our objections to Dr. Rehm's proposal, and at the same time, incidentally, to indicate what we do not regard as safe bases for specific distinctions.*

* Undoubtedly, if a case can be made out for the recognition of Dr. Rehm's species, and this be identical with *Peziza Willkomii* of Thumen, which Dr. Rehm admits, then Thumen's name has priority, and no new name can be received. There is no direct evidence that *Peziza Willkomii*, Hart., is different from Thumen's plant, with which the published figures of *Peziza calycina*, Willkom, will accord equally well as any other form of *P. calycina*.

Not having seen the species described as *P. Ellisiana*, we are unable to express an opinion, and it would be unfair to do so under these circumstances. The colour of the hairs of the cup, and their scabrous character, in addition to the features of the fructification, indicate specific differences, which do not come under the restrictions made with regard to the two other forms.

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## NOTE ON *PEZIZA CALYCINA*. Schum.

*By* Dr. Rehm.

Haec, ut videtur, optime nota et distincta species, tamen microscopice et chemice examinata iterum in duas species separanda est, extus sane simillimas.

*a.* **Peziza calycina.** *(Schum.) Rehm.*

*Exs:* Cooke, f. brit. I., 474. II. 369, A. B.

Sporidia elliptica, long. 0,015-18, lat. 0,005. Asci tenues. Apex ascorum ope solutionis aquosæ Iodii *non* coerulescit.

*b.* **Peziza laricis.** *(Cooke.) Rehm.*

*Syn:* Peziza calycina γ. laricis, Cooke Hdb. p. 685. *Exs:* Fuckel f. rhen. i.206. Rehm ascomyc., 62. Thümen hb. myc. oec. 191 (sub. P. Wilkomii Hartig.) Cooke f. britt. II. 370.

Sporidia obtuso-elliptica, long. 0,016-18, lat. 0,006-7. Apex ascorum crassorum ope solutionis aquosae Iodii *coerulescit.*

Crescit in ramis emortuis Pini Laricis eamque his arboribus valde nosci am fieri dicitur (cf. *Sorauer.* Pflanzenkrankheiten, p. 389.)

Quæ a Nylandero in "Peziza Fen. p. 24," de Peziza calycina dicuntur, propter parvitatem sporarum cum una alterave specie supra notata non congruunt. Neque exemplaria nuper sub. "P. calycina" a cl. Ellis ex Amerika septentrionali comunicata hanc speciem sistunt.

Sit—

**Peziza Ellisiana.** *Rehm.* nov. spec.

Apothecia sparsa, primitus hemisphærica, dein breviter stipitata atque dilatata, c. 1-2 mm lato, luteo-villosa, epithecio aurantiaco-concaviusculo. Sporæ fusiformes, utrinque acuminatæ, simplices, hyalinæ, long. 0,018, lat. 0,0025; biseriatæ in ascis clavatis sessilibus, long. 0,045-60, lat. 0,006-7.

Paraphyses filiformes, ascos superantes, septatæ, c. 0,002 crass.

Pili perithecii dilute viridi-lutescentes, obtusi, simplices, scabri, c. 0,006 crass.

Apex ascorum Iodii ope *cœrulescit.*

Dr. med. Rehm.

Lohr a Main (Bayern),

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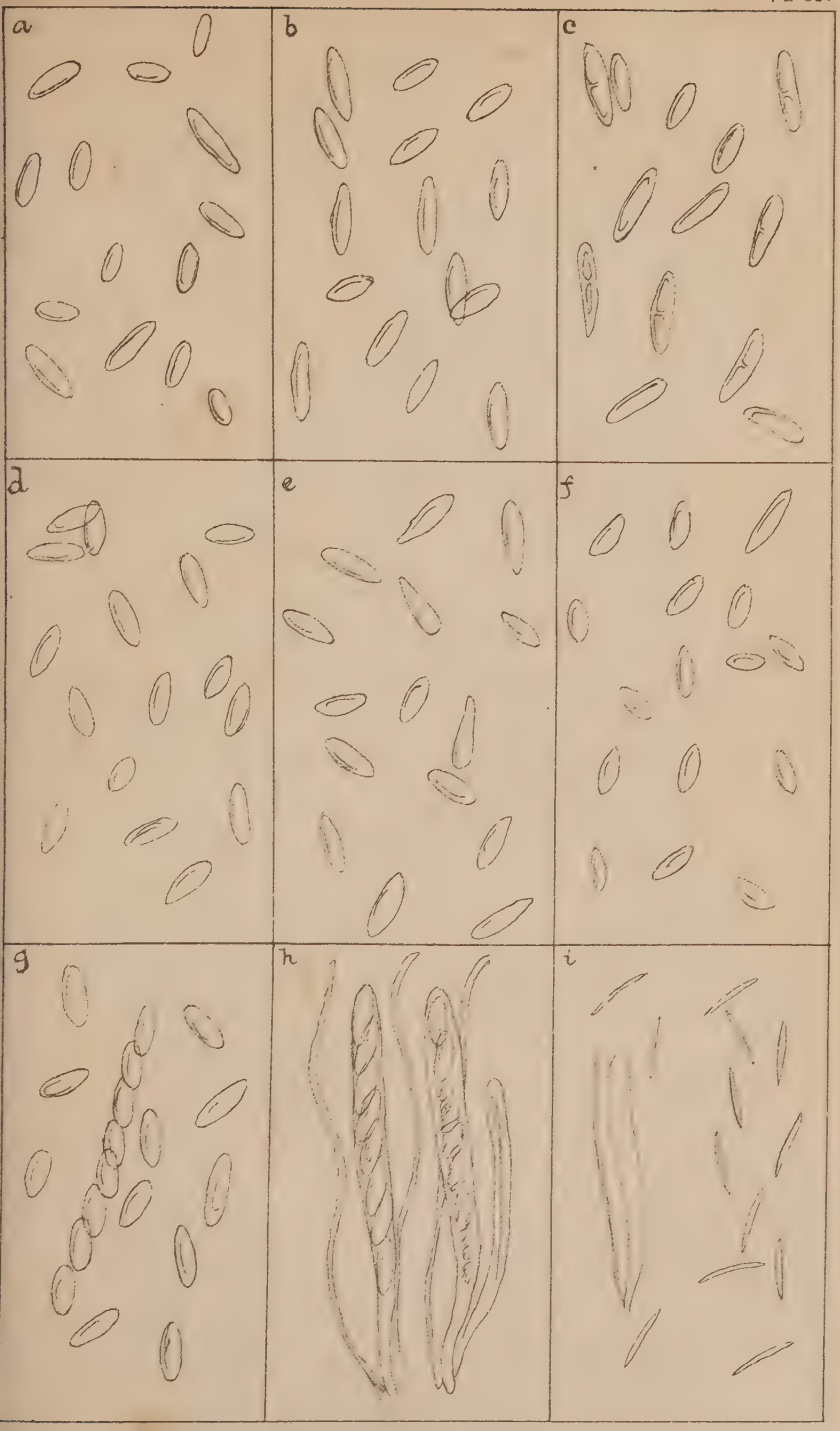



PEZIZA CALYCINA.

*Notes on the Discomycetes of the Edinburgh University Herbarium at the Royal Botanic Garden.* By M. C. Cooke, M.A., LL.D.

By permission of Professor Balfour I have been enabled to examine this portion of the Herbarium more closely than when I arranged the fungi some time ago. Having of late had occasion to apply myself more specially to the Discomycetes, I proffered a few critical notes on the specimens contained in the Edinburgh Herbarium, which would receive illustration from recent experience. This collection is interesting from the fact that it includes a set of the "*Scleromycetes Succicæ*" published by Fries, in addition to some specimens named by the late Dr Greville, and by Klotsch, as well as contributions from more recent mycologists. Here and there a specimen derived from Schweinitz or from Dr Mougeot, adds to the interest and value of the collection.

In such observations as I make, it will be convenient that I should do so under the genera and sub-genera in the order of their arrangement, which is practically that of Fries. Day by day do I become more and more convinced that the system so much in vogue amongst certain continental mycologists of splitting up large and very natural genera, such as those of *Peziza* and *Sphœria*, into a host of smaller ones, without regard to external characters,

on the basis of the fructification alone, is highly prejudicial to the interests of science, and calculated in the end to produce great confusion. On the other hand, I have become more convinced that, in its main features, the Friesian system is the best which has yet been proposed. With these views, I deem no apology necessary for following an order which some may consider antiquated.

No special remark is necessary on any of the genera preceding *Geoglossum*, but as this has been considered by some rather unsatisfactory as to the limits of the species comprised within it, more special attention has been given to it. The result has been considerably to augment the number of good species, and, it is believed, to facilitate the discrimination of all. This has been accomplished by a careful comparison of the fructification, and especially of the paraphyses. There is so close a similarity in the external features of some of the black species that no accurate determination can be made without an examination of the fruit. For a long time only one hirsute species has been known (*G. hirsutum*, P.) The sporidia in this species are very long (0·15 mm.) and 15 septate, the paraphyses septate, scarcely thickened, but curved at the apices. The hairs originate from the base of the hymenium, are rigid, dense, and almost opaque, so that it is impossible to overlook them in the examination of the fruit of this species. It would be quite unnecessary to regard the septation or size of the sporidia were this, as hitherto supposed, the only hirsute species. By the kindness of the Rev. M. J. Berkeley, I have recently examined a much smaller species (*G. Walteri*, B.) from Australia, in which the hairs are somewhat more delicate, the paraphyses very similar, curved at their summit in a like manner, but the sporidia are much smaller (0·1 mm.), and only 7 septate. Two or three years since a North American species (*G. simile*, Peck) was described, apparently in error; for an examination of authentic specimens from Mr Peck himself has convinced me not only that it is a perfectly smooth species, but also that it is identical with *G. glabrum*, P. A third, but still smaller, hirsute form has lately been submitted to me, which may prove distinct.*

* Since determined to be only an interesting variety of *G. hirsutum*, with the clubs nearly smooth or the hairs but slightly longer than the asci.

The two hirsute species are therefore readily distinguishable from each other by the number of septa in the sporidia, and from the rest by the rigid hairs of the hymenium. The smooth species have some of them brown, and others colourless, sporidia. Those with brown sporidia found in Britain are *G. glabrum*, *difforme*, *viscosum*, and *glutinosum*. In *G. viscosum* the paraphyses are without septa, with a subglobose or pyriform head, in the other three species they are septate. In *G. difforme* the paraphyses are very long and flexuous, attenuated rather than thickened at the extremities, becoming almost colourless at the lips. In *G. glabrum* the ultimate four joints are elliptical, easily separating, the terminal one being the largest. In *G. glutinosum* the paraphyses are scarcely septate, but the head is clavate and not subglobose as in *G. viscosum*. The sporidia in *G. glabrum* and *G. difforme* are 7-septate, and in *G. viscosum* and *G. glutinosum* 3-septate, but the average size of the sporidia aid still further in their determination.

| Septa. | | | | |
|---|---|---|---|---|
| 7 | *G. glabrum*.....08·09 | mm. long.... | paraphyses | moniliform. |
| | *G. difforme*..... 0·11 | mm. long.... | „ | flexuous. |
| 3 | *G. viscosum*.....08·095 | mm. long.... | „ | subglobose |
| | *G. glutinosum*...07·075 | mm. long.... | „ | clavate. |

In *G. viride* and *G. olivaceum* the sporidia are colourless (as also, I believe, in *G. atropurpureum*, which I have never seen), but differ in size. The paraphyses are less highly developed. It needs scarcely to be remarked that the individual specimens in the Herbarium have not been microscopically examined to ascertain how far they may have been accurately determined. To have done so with nearly 100 specimens, each of which required some hours softening in water, would have occupied considerable time, and with these remarks recorded, would hardly be essential. It may, however, not be out of place to allude to the remaining species which are not recorded as British. Two species *G. farinaceum* and *G. rufum* are described by Schweinitz as inhabiting the United States, but these I have never seen. Two additional species with colourless sporidia are found in North America, *i.e.*, *G. microsporum*, C. & P., with 7 very delicate septa, when fully matured, and a tawny-yellowish species, *G. luteum*, Peck, with 5 septa. There also a smooth

black species with coloured sporidia, of 15 septa, for some time confounded with *G. glutinosum*, now bears the name of *G. Peckianum*, C. In Australia (probably) a black species with coloured paraphyses and colourless sporidia, without septa, is represented by a specimen (ex herb. Hooker) not localised, which has been named *G. Hookeri*, C. Two other species with coloured sporidia and paraphyses, the latter closely connate, have been found, one *G. australe*, C., in Australia, the other, *G. Mulleri*, B., in Tasmania. In the former the sporidia (0·12 mm. long) are 7-septate, and in the latter (06·07 mm. long) for some time uniseptate and at length triseptate. The sporidia in the latter are shorter than in any other species with coloured sporidia. Of the 17 species 2 are hirsute and 15 smooth; of the latter 7 have coloured sporidia and 6 (perhaps 8) colourless sporidia. Of the whole, 8 species are European, 5 North American, and 4 Australasian. Two at least of the European species are almost cosmopolitan, *i.e.*, *G. glabrum* and *G. hirsutum*, whilst the third hirsute form already alluded to—from the United States—is closely allied to, if not identical with, *Geoglossum hirsutum*. Other European species extend into North America.

Passing over the other genera with the intimation that specimens of *Leotia circinans*, recently found in Scotland (for the first time in the British Isles), have been added to the Herbarium, we come to the large genus *Peziza*.

In Macropodes the *P. melaena*, Fr., is represented by three specimens under the name of *P. Vogesiaca*, P., from Dr Mougeot. Fries admits ("Sys. Myc." ii. p. 60) that this is the same species. The asci are cylindrical, and the sporidia globose (·015 mm. diam.), the paraphyses are thickened above and brown ("Grevillea," iii. fig. 10). *Peziza tuberosa*, Bull., hitherto included under this section, is removed by some recent authorities to *Hymenoscypha* into proximity with *Peziza firma*, P., and in this change I am disposed to concur.

Cochleatæ.—The specimens marked "Mougeot, 1824," and named "*Peziza chrysoclaris*, Pers. in litt.," clearly belong to *Peziza fulgens*, P., with minute globose sporidia not exceeding ·005 mm. in diameter ("Grevillea," iii. fig 26).

Cupulares.—The single specimen named "*Peziza crenata*,

P." from Persoon himself, is *Peziza cupularis*, Linn., of which *P. crenata*, Pers., is cited by Fries ("Sys. Myc." ii. 62) as a synonym. The sporidia are elliptical (·002 × ·012 mm.), and are identical with the fruit of the specimens published by Fuckel ("Grevillea," iii. fig. 40).

Humaria.—The red species under this section are so similar in external appearance that it is not surprising to find them named inaccurately in old specimens which date previous to the recognition of the fruit as an important guide to the discrimination of species. In this collection *P. leucoloma*, P., is the one species to which different plants are ascribed. The specimens published by C. E. Broome, in Cooke's "Fungi Britannici," No. 229, are *Peziza Crouani*, C. The specimen on wood marked "N. America, Schweinitz," is almost beyond identification. It belongs, however, to the section *Mollisia*, has small sausage-shaped sporidia, and probably is either *P. vinosa* or *P. rubella*, for the sporidia in both are nearly alike in form and size. The specimens from Mougeot, 1824, named "*Peziza leucoloma*, Persoon in litt.," are not identical with what is regarded as the true *Peziza leucoloma*. The form and appearance is that of the figures in Rabenhorst's "Mycologia Europœa," plate iv. fig. 3, and called on the plate, *Peziza Polytrichi*, but in the letterpress, *Peziza vivida*. The stem-like base is longer than the diameter of the cup, the asci are cylindrical, sporidia elliptic, ·025 × ·012 mm., epispore granulated, and thus agrees with the *Peziza vivida*, Nyl. ("Obs. Pez. Fenn." p. 22); also is it identical with the specimens cited by Nylander and published in Rabenhorst's "Herb. Myc." No. 310. Hence I conclude it to be the *Peziza vivida*, Nyl., which he says has sporidia ·018–·025 × ·011–·012 mm. The specimen by Dr Arnott in the Herbarium is too poor to be worth examining, as nothing would be left. The specimens No. 1, Glenshiel, 1821, appears to be the same *P. vivida*, Nyl., No. 2, small forms of *Peziza aurantia*. If none of these are *Peziza leucoloma*, P., the question very naturally arises, What is that species? If the specimens above cited were really derived from Persoon, it might be affirmed that at least they were regarded by him as identical with *P. leucoloma*, but it is probable that they were collected by Dr Mougeot, and by him were designated

by Persoon's manuscript name. It is not impossible that Persoon himself may have confounded two or more species together under one specific name. Comparison of the figures published in "Grevillea," vol. iii., will show the difference of fruit in the two species, fig. 80, *P. vivida*, the sporidia are granulated ·025 × ·012 mm. (from Rabh. "Fung. Eur." 310) and fig. 73, smooth and nucleate, ·02 × ·01 mm. (from Fckl. "Fungi. Rhen." No. 1219). It is clear that the specimens published by Fuckel are near, and probably identical with the species determined by Berkeley and Broome ("Ann. Nat. Hist." No. 1156*), who took considerable pains to clear up the difficulties in identification of the red species of *Humaria*. According to them *P. leucoloma* has elliptic uninucleated sporidia, ·015–·02 × ·01 mm., whilst Fuckel describes his *P. leucoloma*, P. as having sporidia which are uninucleate ·02 × ·012 mm. The specimens published by Fuckel, from which the figure in "Grevillea" (iii. fig. 73) is drawn, measure ·02 × ·01 mm. All these measurements agree sufficiently to indicate the same species, which is accepted here as the true *P. leucoloma*, P.

What then is the species which Karsten and Nylander have in view as *P. leucoloma?* They both agree in indicating the same plant, published in Karsten's "Fungi Fennicæ," No. 537, and described in "Flor. Fennica" (part i. p. 63) as sessile, with a fimbriate margin, with sphæroid sporidia ·009–·013 × ·008–·001 mm. The *Peziza leucoloma* of Rabenhorst's "Mycologia Europœa," with globose sporidia ·011–·013 is probably the same thing. In both instances the sporidia are described as smooth. It is most probable that *Peziza Polytrichi*, Schum. is the species so described by Karsten and Rabenhorst as having smooth sphæroid sporidia, since the *P. Polytrichi* of Karsten and Nylander has rough sporidia, and is clearly identical with *Peziza Crouani*, C. (*Ascobolus Crouani*, Cooke, which, however, is not a good *Ascobolus*) and *Lamprospora miniata*, De Notaris. It may be remarked that the fibrillose nature of the external cells of the cup in *Peziza vivida*, Nyl., is very distinctive. *Peziza Crouani*, Cooke, included under *Ascobolus* in the "Handbook," must be transferred to *Humaria*.

Encœlia is so manifestly an aberrant section of *Peziza* in its coriaceous substance that I should follow Fries

("Summa Veg. Scan." p. 362), and transfer *Peziza fascicularis*, Fr., and *Peziza furfuracea*, Fr., to the genus *Dermatea*.

Sarcoscypha.—Recently I have examined a fresh specimen of *Peziza coccinea*, Jacq., which had the disc of a delicate cream colour. In other respects it did not differ in the least from the crimson form in company with which it was growing. *Peziza lanuginosa* is the only example which the Herbarium contains of a most singular group of *Pezizæ* which have a sort of semi-subterranean habit, mostly of dull colours, externally more or less densely woolly, and so habitually gritty from the particles of sand, which are closely interwoven with the woolly coat, that it is difficult to wash a fragment sufficiently clean to examine the structure properly by the microscope. The species which constitute this group are *Peziza lanuginosa*, Bull; *P. sepulta*, Fries; *P. geaster*, B. and Br.; *P. arenaria*, Osb.; *P. arenicola*, Lev.; *P. arenosa*, Fckl.; and allied to them, but less disposed to be hypogeous are *P. hemispherica*., Wigg.; *P. pellita*, C. and P.; *P. tenuis*, Fckl.; *P. flavo-virens*, Fckl.; *P. phœoloma*, Walr.; *P. macrochœta*, Fries; *P. Plumieri*, Fries; *P. fusicarpa*, Gerard; and *P. nigrella*, P.

The red species of *Sarcoscypha* are very numerous, and like the red species of *Humaria*, present many difficulties; none of these are more tedious than the attempt to clear away the mistakes which have been associated with *Peziza hirta*, Sch., and *P. scutellata*, Linn. The specimens in the Herbarium from Kritschmar, named *P. setosa*, are undoubtedly a form of *P. scutellata* (see "Grevillea," iii. figs. 113, 114). The somewhat rough sporidia are ·025 × ·015 mm. whereas the smooth sporidia of the *Peziza setosa*, Nees, as published by Fuckel, are ·02 × ·01, the cups are less open, and there is a difference in the external hairs.

The specimen named by Klotsch, *P. stercorea*, is clearly a mistake, it being *P. granulata*. The supposed variety of *P. theleboloides* published in "Fungi Britt." No. 572, is clearly entitled to the rank of a distinct species under the name of *Peziza rubra*, C., a name which has for some time been given to it (see "Grevillea," iii. figs. 118, 119). The cups are dull red, and *not* yellow, the hairs are brown and *not* white, they are also coarser, the sporidia are larger, and the cups are smaller. Although growing together, the two

species are quite distinct. Closely allied is the beautiful yellow species found on the ground amongst nettles, in the woods at Dalmeny, N.B., during the visit of the British Association to Edinburgh. It has much the size and appearance of *P. theleboloides*, but the hairs are five or six times as long, and there is a manifest difference in the fruit ("Grevillea," iii. fig. 21). This *Peziza Dalmeniensis*, Cooke, has been found nowhere else at present, and a specimen has been added to the Herbarium. The specimens of *Peziza vitellina*, P., from Dr Mougeot, are undoubtedly reliable (see "Grevillea," iii. fig. 110). It is probably not anywhere common.

Dasyscypha.—In this section again we encounter a group of species which have been somewhat confounded in *Peziza calycina*, Sch., and its allies. The ordinary form, which is usually regarded as *P. calycina*, Sch., is represented in the Herbarium by specimens published in "Fungi Britannici," as well as others. The sporidia are elongated elliptical, or rather oblong, measuring ·02–·023 × ·009–·01 mm. This is generally recognised as the true *P. calycina*, with which the specimens published in Rehm's "Ascomyceten," and Fuckel's "Fungi Rhenani" agree. The fruit is figured in "Grevillea" (iii. fig. 166). The late A. Jerdon called my attention to a form of this species, as he supposed, which was found on *Abies*, and referred to the variety *β abietis*. On examination it was found that although externally undistinguishable from *P. calycina*, it was quite different in fruit. The sporidia are minute, sausage-shaped, not more than ·009–·01 mm. long, and about ·003 mm. broad. This is clearly sufficient grounds for regarding it as a distinct species, under the name of *Peziza subtilissima* ("Grevillea," iii. fig. 167). Karsten gives nearly the same measurements for the sporidia of *P. calycina*, as those last named, and cites *Peziza bicolor*, Bull, as a synonym. He evidently has confounded *P. subtilissima* with *P. calycina*. In nearly every collection which I have examined since this discovery, I have found both species under the name of *P. calycina*, including the Edinburgh Herbarium, where I was surprised to find that Fries had fallen into the same error, through not appealing to the microscope, by publishing in the "Scleromycetes

Suecicæ," No. 360, a specimen of *P. subtilissima*. The specimen from Mougeot, 1824, is the same thing, as also that from the late Sir Wm. Jardine, under the name of *Peziza pulchella*.

The question to be determined is, which is the true *P. calycina*, Schum. Messrs Berkeley and Broome consider the species with large sporidia, to which the specimens in Berkeley's "British Fungi" belong, to be the genuine original species. On the other hand is the strong evidence afforded by Fries's "Scleromycetes Suecicæ," and Dr Mougeot, in favour of the species with small sporidia. One of them must be wrong, and if it can be shown that what I call *P. subtilissima* is really *P. calycina*, then the large-spored species might assume the name of *P. pulchella*, which has been regarded as a synonym of *P. calycina*. At any rate here are two distinct species, which no one can doubt who will submit them to examination.

*P. subtilissima*, Cooke, sporidia, linear, ·009–·01 × ·003 mm.

*P. calycina*, Schum., sporidia oval, ·02–·023 × ·01 mm.

The sporidia varies considerably within certain limits in *P. calycina*. In a form found growing on larch by Sir C. Trevelyan, the sporidia are sometimes as much as ·03–·035 × ·009, somewhat larger at one end, so as to have a clavate form, and the endochrome divided so that the sporidia have the appearance of being uniseptate. I have contented myself with calling this *P. calycina* var. *Trevelyani*, until the examination of additional specimens shall give me any stronger reasons than I now have for regarding the difference as of specific value. It may be remarked here that *Peziza lachnoderma*, B.; *P. illota*, B. and Br.; *P. simillima*, B. and Br.; *P. rhaphidophora*, B. and C.; *P. Agassizii*, B. and C.; and *P. chrysophthalma*, P. are all exotic species, very much like *P. calycina* and *P. subtilissima* externally, but are widely different in their fruit, as will be seen by reference to the figures published in the 3d volume of "Grevillea."

The specimens published in "Fungi Britannici," No. 275, as *P. albo-testacea*, Desm., do not belong to that species, but to *Cyphella capula*, Fr. (see "Handbook," p. 328, where this is in fact acknowledged). *Peziza albo-violascens*, P., in like

manner, is *Cyphella Curreyi*, B., in all collections, and *Peziza villosa*, P., and *Peziza punctiformis*, Fr., are also species of *Cyphella*. *Peziza anomala*, P., is *Solenia ochracea*, Fr. None of these species have fruit contained in asci, to which might be added *Peziza millepunctata*, Lib., and *Peziza syringea*, Wallr.

Tapesia.—All the specimens published of *Peziza pruinata*, Schwz., consist of a Lichen = *Arthonia confluens*, as determined by the Rev. M. J. Berkeley. The specimens of *Peziza Wauchii*, Grev. (Grev. "Crypt. Flor." t. 139), in the Herbarium, collected by Captain Wauch, and named by Greville, at once determine the question as to the identity of that species with *Peziza aurelia*, P., of which the specimens leave no doubt. The figure above cited is too highly coloured in the mycelium, and would appear to belong to a different species.

Hymenoscypha.—I have no doubt that the specimens to which is attached the name of *Peziza scirpi*, Rabh., belong to *Helotium culmigenum*, Fr.

Mollisia.—The *Peziza arenula*, A. and S., of Fries's "Scler. Suec." No. 110, does not appear to be a *Peziza;* there is no fruit, and it greatly resembles *Leptostroma litigiosum*, Desm. More than one species of *Peziza* has borne the name of *Peziza juncina*, P., which *P. tephromelas*, Pass., resembles. It seems, however, to be a better species of *Patellaria* than of *Peziza*. Under *Peziza atrata*, P., the form on *Spiræa* appears to be identical with the *Peziza ulmariæ* of the "Handbook." The species published as a variety of *P. atrata* in "Fungi Britannica," No. 284, should rank as a distinct species under the name of *Peziza atrocinerea*, C.; it was found on *Polygonum aviculare*, and differs from the two or three other dark species on *Polygonum*, such as *P. Polygoni*, Lasch., and *P. Polygoni*, Rehm., for both of these differ in themselves. For the sake of distinction the latter may be called *P. Polygonorum*.

Durella.—It has been shown in "Grevillea," by the Rev. W. A. Leighton, that *Peziza resinæ* is a lichen, and should have restored to it the name of *Lecidea resinæ*. Also *Peziza Mougeotii* should be transferred to lichens. Under the name of *Peziza compressa*, P., two black *Peziæ* of like size and habit have been confounded. One of these

apparently the most common British form, has minute sausage-shaped sporidia (·008 × ·002 mm.), to which the specimens in the Herbarium belong. The other has triseptate sporidia (·02 × ·004 mm.), and is the *Peziza macrospora*, Fckl.

Helotium.—There is little to call for observation under this genus, except that authentic specimens of *Helotium cribrosum* and *Helotium claroflavum*—apparently from the late Dr Greville (the specimen from A. Jerdon under the latter name being different)—afford the means of determining the fruit. The sporidia in *H. cribrosum* are elliptical (·02 × ·01 mm.), uniseriate, smooth hyaline, or with a brownish tint; the paraphyses are also amber-coloured. *Helotium claroflavum* is not sufficiently mature for the sporidia to leave the asci; hence their precise nature could scarcely be determined with certainty. In some of the asci the contents were still granular; in others the linear sporidia appear to be ·027 × ·004 mm., but this determination is given with some diffidence. In *Helotium flavovirens*, from Dr Mougeot, the sporidia are filiform, nearly as long as the very long slender asci (·16 mm.). *Helotium æruginosum*, Fr., *Helotium versiforme*, Fr., *Peziza chlorascens*, and *Peziza chlora*, Schw., are included by Fries under *Chlorosplenium*.

Patellaria.—It should be determined what is the true *Peziza lecideola*, Fr., now usually included under this genus. The specimens published by Fries ("Scler. Suec." 137) in this Herbarium have narrow lanceolate, triseptate, hyaline sporidia (·012–·014 × ·006 mm.), almost identical with those of *Patellaria proxima*, B. and Br., whereas in specimens from C. E. Broome, I find them elliptical, uniseptate, and brown. In *Peziza lecideola*, distributed by Dr Curtis from the United States, the sporidia are very minute, sausage-shaped. Nylander gives the fruit of *P. lecideola*, Fr., as oblong-ellipsoid, triseptate, ·011–·015 × ·005–·006 mm., and by Karsten as triseptate, ·01–·016 × ·005–·006 mm. My own impression is, that the specimens in the Herbarium from Fries, agreeing as they do with other specimens published in "Scleromycetes," as cited by Nylander, should be accepted as the true *P. lecideola*, Fr. The specimens published in the same work by Fries ("Scler. Suec." No. 336) as *Patellaria atrata* are not *Patellaria*, but *Tympanis confusa*,

Nyl. (see Nylander, "Observations," pp. 69). The sporidia are very minute, spermatoid, and numerous (myriospores), as in *Tympanis*, to which genus it clearly belongs. *Patellaria atrata* has quite different fruit, as usually understood. *Patellaria constipata*, Bloxam, is identical with *Patellaria livida*, B. and Br., to which must also be referred *Dermatea abietina*, Awd. in Rabenhorst's "Fungi Europæa," No. 1027. This plant appears to be congeneric with *Peziza carpinea*, P., and both would probably be better placed under *Dermatea*.

Tympanis.—The minute specimens of *Peziza plicato-crenata*, Schwz., from North America, derived from Schweinitz himself, the cups of which are ·5–1 mm. broad, enable us to determine it as a good species of *Tympanis*, with clavate asci, uniseriate sporidia, the latter unequally uniseptate, constricted at the septum, the upper and broader, but shorter, cell again at length uniseptate, the lower cell biseptate, so that ultimately there are four septa (·04 × ·012 mm.), and colourless. *Tympanis pinastri*, Fr., is another of the disputed, or uncertain species, the specimens from Fries ("Scler. Suec." 55) are barren. Two specimens, one of which apparently from Mougeot, are *Cenangium ferruginosum*, Fr., with simple, brownish, elliptical sporidia. The observations of Nylander ("Obs Pez. Fenn." p. 73) should be consulted, and compared with those of Tulasne in "Sel. Fung. Carp." The specimens of *Peziza farinacea*, B. (Fries, "S. S." 294), are in bad condition, but may probably be referred to *Peziza pinicola*, Fr., and this may be a *Triblidium*. *Peziza andromedæ*, Schwz., accords rather with *Tympanis*, or with *Cenangium*, as the specimen is not first rate, and contains only lunate stylospores.

Cenangium.—The specimens published by Fries ("Scler. Suec." No. 293) as *Cenangium acerinum*, Fr., is a very singular species. The paraphyses are slightly thickened above, very profuse, and in a mass of a deep bright blue at the top. The contents of the asci were assuming ovate forms, and if but little changed in the mature sporidia would be about ·012 × ·014 mm.

Agyrium.—It is generally admitted that *Agyrium rufum*, Fr., should be relegated to lichens. *Agyrium cæsium*, Fr. ("Scler. Suec." No. 279), has very small cylindrical asci, not more than ·035 mm. long. The form of the minute sporidia could not be satisfactorily distinguished.

Stictis.—The *Stictis atrovirens* of Fries ("Scler. Suec." No. 270), is referred by Fries himself ("Summa Veg. Scan.") to *Stictis atrocyanea*, Fr., the asci are clavate, and the sporidia fusiform, hyaline 3–7, septate ·04 mm. long. *Stictis mollis*, Fr., is in like manner referred to *Stictis pupula*. *Stictis pallida*, Fr. (S. S. 275), has triseptate sporidia ·02 mm. long.

Phacidium.—The specimen of *Hysterium valvatum* from Appin, collected by Capt. Carmichael, is *Phacidium pini*. The specimen of *Phacidium rugosum*, Fr., in Fries's "Scler. Suec." (No. 355), has clavate asci very much stipitate, with sausage-shaped sporidia. *Phacidium rubi* (Fries, "Scler. Suec." No. 56) is unfortunately barren. *Phacidium Ledi*, Fr. ("S. S." 327), has only stylospores, or apparently stylospores, for no traces of asci were found. There is in the Herbarium specimens of what seems to be a minute *Phacidium* on leaves of *Empetrum nigrum*, very much smaller than *Xyloma Empetri*, D.C., which has linear, straight stylospores (·025 mm. long). *Phacidium multivalve*, Fr., from Mougeot and others, is what is referred to *Phacidium ilicis* in the "Handbook," the imperfect condition of which is *Ceuthospora phacidioides*. *Phacidium aquifolii* (Moug., No. 562) is much smaller, and has been found in Britain; it is the *Trochila ilicis* (Fries, "Summa Veg. Scan."), and differs from *Stegia ilicis*, Fr. *Excipula pithya* (Fries, "Scler. Suec." No. 172), is not a *Phacidium*, but probably a *Tympanis*, although Fries has referred it to *Triblidium*. It seems to be distinct from *Cenangium pithyum*, B. and C., but whether the same as *Tympanis pithya*, Karst, I have had no opportunity of determining. The sporidia appear to be immature, filled with granular matter, but whether myriosporous or not could not be determined. *Phacidium fibrosum*, Fr. ("Scler. Suec." 162), is referred by Fries himself to *Peziza pinicola*, Reb.

Hysterium.—The specimen of *Hysterium varium*, Grev. ("Crypt. Flora," t. 233), which is the *Hysterium Carmichaelianum*, Berk., from the late Dr Greville, is of great interest as proving the character of the fruit in this species. The sporidia greatly resemble those of *Hysterium repandum*, Blox., but larger, *i.e.*, they are uniseriate, dark brown, ovate, with a hyaline apiculus at one end ·03–·032 × ·018 mm., whereas those of *H. repandum*, Blox., are ·025 × ·015 mm. A few

threads of a black mould are mixed with the perithecia which have a pale stem, and an opaque, brown, subglobose head, rather larger than the sporidia. This mould may have some connection with the *Hysterium*, but of this there is no evidence. The small fragment of *Hysterium insidens*, Schwz., from Schweinitz, is identical with specimens I have received from North America, and is evidently the same as that alluded to by Duby ("Hyst." p. 26), under *H. complanatum*. It is clearly distinct from the latter species, has biseriate, brown sporidia (·045–·05 × ·015 mm.), somewhat fusiform, straight or curved, about 9 septate, with the cell above the centre largest and swollen, about 3 septa above, and 4 or 5 below. *Hysterium varium*, Fries (apparently from Fries himself), is unfortunately quite exolete, not a single sporidium could be found to show whether Duby's determination is correct. There are at least sixty good species of *Hysterium*, independent of those now usually grouped under other genera, that is, of *Hysterium* as understood by Duby. Of this number nearly one half are found in the United States. A very singular species occurs on reeds in North America, in which the sporidia are clavate, bright brown and multiseptate, more resembling the sporidia of such species of *Patellaria*, as *P. atrata*, except in the sporidia being coloured. When Duby published his memoir, and from that period almost to the present, the genus *Colpoma* has been regarded as consisting of a single species, the very common *Colpoma quercinum*. Having examined specimens of what is clearly the *Hysterium Azaleæ* of Schweinitz from the United States, I was at once convinced that it was congeneric with *Colpoma quercinum*. The sporidia are filiform, the length of the ascis, and the paraphyses very long, curved and twisted at the tips after the manner of a corkscrew; in both these features it resembles the other species. More recently, or in 1872, I had specimens sent me on juniper of an allied species, *Colpoma juniperinum*, C. and P., in this also the sporidia and the paraphyses resemble the others, so that here are three good species of *Colpoma*.

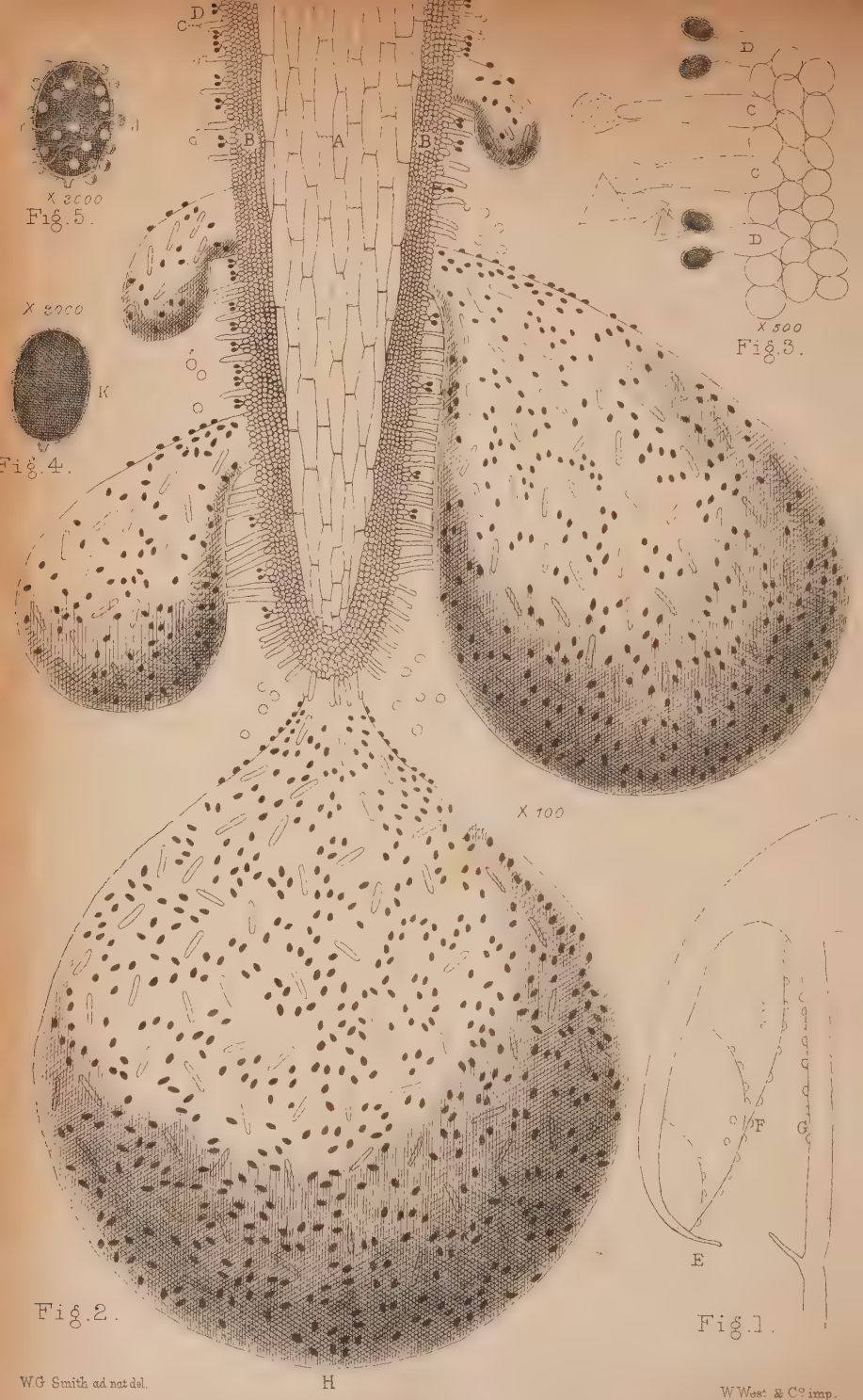
The majority of published specimens of *Hysterium petiolare* are referable to *Peziza erumpens*, Grev. In other instances, where an *Hysterium* is found on the petioles of *Acer*, the species does not seem to be distinguishable from

*Hypoderma virgultorum*, var. *petiolare*. The *Hysterium plantarum*, Schuz., belongs also, as I believe, to *Hypoderma*.

Stegia.—*Stegia arundinacea*, Fr., is represented by the specimens in Fries's "Scleromycetes Suecicæ," No. 352, and Mougeot and Nestler's, No. 983. There has been some confusion with this species, which is the *Peziza Kneiffii*, Wallr, as indicated by Messrs Berkeley and Broome in "Annals of Natural History" (Jan. 1875). The specimens published by Fries himself, by Mougeot and Nestler, and by Desmazieres all agree with each other and with a specimen I received from the late C. Montagne. The asci are from ·07 to ·08 mm. long, the sporidia linear, and about ·008 mm. long. Fuckel has apparently found the same thing, but he describes the sporidia as fusiform and 1–2 nucleate ·008 × ·0025 mm. Possibly the nuclei disappear with age, which may account for their absence in the specimens now examined. Under the impression, I presume, that *Peziza Kneiffii*, Wallr., was something distinct from *Stegia arundinacea*, or as at one time written *Eustegia arundinacea*, Fr., several fungi have been published under that name. In the British Museum collection are specimens of a form of *Peziza fusca* named by Bloxam *Peziza Kneiffii*, which is clearly an error. Montague's plant was named by himself *Peziza Kneiffii*, but on re-examination, although at first disposed to think otherwise, I am convinced that it is the same as *Stegia arundinacea*, Fr., with the pseudo-subiculum more highly developed. The most recent instance of substitution occurs in Rehm's "Ascomyceten," in which, under No. 113 is published a species there called *Peziza Kneiffii*, which is altogether different from *Stegia*. It belongs to the sessile *Dasyscyphæ*, the cup being densely clothed with long delicate tawny hairs, although these are quite colourless when magnified 400 diameters. The asci in this species are ·06 mm. long, and the linear curved, or sausage-shaped sporidia, are ·015–·017 mm. long. This species I have called *Peziza* (*Dasyscypha*) *Winteri*, Dr Winter having described most of the new species published by Rehm. It may be remarked that in the form of *P. fusca*, which Bloxam has called *P. Kneiffii*, the asci are also about ·06 mm. long, and the similar sporidia ·013 mm. long. The sporidia of *Eustegia arundinacea*, Fr., appear to be variable, for I find them in Mon-

tagne's specimens to be ·013 mm. long. Fuckel gives his measurements as ·008 mm. long.

Bloxamia.—It has been hitherto somewhat uncertain where this genus should be placed. It appears to me that its nearest affinities are amongst the *Stictei*, probably next to *Agyrium*. The only known species is *Bloxamia truncata*, B. and Br.

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Reproduction of Agaricus lacrymabundus.

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# HOW MUSHROOMS ARE REPRODUCED.

## (*Agaricus lacrymabundus. Fr.*)

By WORTHINGTON G. SMITH, F.L.S., M.A.I.
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[PLATE CXXXII.]

POSSIBLY there is no branch of fungology so little understood as the reproductive process in the *Hymenomycetes*, of which family our common mushroom is a good example. Professor Sachs, in his recently published "Text-Book of Botany," in referring to the *Basidiomycetes* (of which the *Hymenomycetes* is one family), says: "Although the largest and most beautiful fungi belong to this order, yet their course of development is at present only very imperfectly known. In contrast to the variety of form occasioned by the alternation of generations in most other fungi, and to the singular phenomena of the mycelium of the *Ascomycetes*, it is remarkable that similar processes have not yet been established in this class. The origin from the mycelium of the usually large receptacles, and their further development, are known in their more conspicuous features, as is also the mode of germination of their basidiospores; but the history of the mycelium before it forms the receptacle is still unknown. "I must therefore," says the professor, "content myself with a few morphological explanations of the development of the latter in the most striking forms of the *Hymenomycetes* and *Gasteromycetes*." Unfortunately for Professor Sachs, the English editors of the "Text-Book" refer to Œrsted's observations of the reproductive process in *Agaricus variabilis* as reproduced in the "Quarterly Journal of Microscopical Science" for 1868, p. 18. As Œrsted founded his conclusions upon mycelium gathered from a mushroom-bed where *A. variabilis* is (as far as my experience goes) never found, his deductions lose a great deal of their value. Indeed, nearly the whole subgenus to which *A. variabilis* belongs is peculiar to decayed wood and moss. Formerly *A. variabilis* was included in the subgenus Crepidotus but Professor Elias

Fries, of Upsala, following the views not long since published by the writer of these lines, now places the species in a new subgenus of Agaricus,—Claudopus (*Hymenomycetes Europœi, Epicriseos*, p. 213), and says, under *Agaricus* (*Claudopus*) *variabilis*: "Ad ligna et truncos emortuos, præcipue Abietis."

In illustration of the hymenium, or reproductive surface of the gills in the *Hymenomycetes*, Professor Sachs gives a figure of the minute structure of the common mushroom (*Agaricus campestris*). But, unfortunately, the figure and description alike are far from correct. Sachs says the basidia in this species produce only two spores, whilst in other *Hymenomycetes* the number is usually four, and the illustration is made to accord with the description. But the fact of the case is that there *are* four spores produced in each basidium in *Agaricus campestris*, and this fact does not apply to *A. campestris* alone, but to every variety of it, and every variety of its numerous allies, of which the common horse mushroom (*A. arvensis*) is one. The nature of the hymenium of the common mushroom is correctly figured by Dr. M. C. Cooke, in the "Popular Science Review" for Oct. 1869, Pl. LIII. fig. 14, where each basidium is shown, furnished with four (not two) spicules. Each of these spicules normally bears a spore, but it is a common thing in Agarics for the four spores to be produced two at a time, diagonally; as the first two spores become ripe, two other and younger spores appear on the spicules at right angles with the first, and the two latter push the two former off. Sachs was evidently unacquainted with this fact. Seeing only two spores at a time on the basidia of the mushroom, he overlooked the fact that two had already been pushed off, or were not yet produced. It is, however, quite common to see all four spores produced at the same time in the mushroom, so that there is not the slightest foundation for reducing the basidia in *Agaricus campestris* to the production of two spores only. Le Maout and Decaisne, in their "Descriptive and Analytical Botany," p. 953, correctly figure the basidia in *A. campestris* with four spores; but, unfortunately, the description of reference to the basidia and the analogous organs (cystidia) is far from correct. These authors are still more incorrect under their description of *Geaster hygrometricus* (p. 956), one of the starry puff-balls, and, like the mushroom itself, one of the *Basidiomycetes*. This species is described by Le Maont and Decaisne as a hypogeal globose plant, which, they say, presents the following curious phenomenon: "when mature and still underground, if the season be dry, the outer envelope, which is hard, tough and hygrometric, divides into strips from the crown to the base; these strips spread horizontally, raising the plant

above its former position in the ground; on rain or damp supervening, the strips return to their former position; on the return of the drought, this process is repeated, until the Fungus reaches the surface, becomes epigeal, and spreads out there; then the membrane of the conceptacle opens to emit the spores in the form of dust." This description is altogether incorrect; in fact, just the opposite state of things holds good, for the strips become horizontal from moisture, and are rigidly inflexed when dry. Fries pointed this out, in his "Systema Mycologicum," nearly fifty years ago. These errors, in our best and most recent text-books, are here pointed out, not from any desire to find fault or detract in the slightest degree from two thoroughly excellent works, but simply to show how difficult it is to make new and correct observations. In the following paper and the one recently published by me, on the reproduction of *Coprinus radiatus*, in the "Gardeners' Chronicle" for Oct. 16 and 23, 1875, I have, to a certain extent, broken fresh ground. My views, although long since foreshadowed by various competent botanists, are yet different from those now generally held regarding the reproductive process in the *Basidiomycetes*. If I am in error as to my supposed facts, or the deductions I draw from them, I am at least in good company, and I have not warped any of my observations to fall in with the previously expressed views of any other writers whatever.

The nature of the gills in various members of the mushroom tribe differs very much, and this difference is especially remarkable in the absence or presence of the trama, and in the number, form, and size of the cystidia. In the genus Coprinus there is no trama to the gills. The trama in true Agarics is formed by cells, which are of a different nature from the other simple cells which go to form the gills, and this trama forms the intermediate substance between the hymenial surfaces.

Nothing can be more different than the interior structure of the gills in the genus Coprinus, and in *Agaricus lacrymabundus* (Fr.). In fig. 1 is shown, enlarged 150 diameters, a vertical transverse section down a gill of *C. radiatus* (Fr.), which species is (though minute) quite typical of the entire genus. The trama with its large cells would, if present, be at A; but a glance at the figure will show that the individual cells throughout this section are almost identical in size. If reference is now made to the similar section of a gill belonging to *A. lacrymabundus*, Fr. (and shown on Pl. CXXXII.). the nature of the cells at A, which go to form the trama, will be quite apparent. Wide differences of cell-form like this are common in the mushroom tribe, but the difference of form as found amongst the cystidia is still more striking. In *Coprinus*

*atramentarius* (Fr.) the cystidia are indeed so large that each individual cystidium would hold within itself more than 300 of the ordinary cells which go to build up the pileus. These facts

Fig. 1.

W.H.B. AD. NAT. SC.

Coprinus comatus. Fr.
Vertical section and surface (F) of Gill enlarged 150 dia.

regarding the cap and the hymenial surface (to say nothing of the gills often completely separating from the horny hymenophorum, as in Paxillus), and many other known facts in regard to the nature of the stem and its outer surface, go far to dis-

prove the hypothesis that the higher fungi found under the Agaricini may be generalised as mere concreted masses of moulds. No bringing together into a mass of a forest of Penicellium could even make an Agaricus, and to me there is nothing in common between the conidio-spores of Penicellium and the basidio-spores of the Agaricini.

The various bodies which, as I believe, belong to the reproductive process in the mushroom tribe are seen in figs. 1 and 2 and Pl. CXXXII. The peculiar cells of the trama are shown at A, Pl. CXXXII., the simple cells which form the external and hymenial surface at B, and the privileged cells at C, D. C shows the cystidia and D the basidia. Each basidium in the Agaricini bears four minute spicules, which carry the same number of spores. The difference in size between the basidia and cystidia is often immense, and in *Agaricus lacrymabundus* the perfect forms of the two organs are very different from each other; they, however, so approach each other in this species, that every intermediate form between a cystidium and a basidium may be observed. In *Coprinus radiatus*, as I have shown elsewhere, the cystidia have their contents differentiated, and at once produce spermatozoids; or they germinate, and the spermatozoids are produced from a differentiation which then takes place at the end of the thread; these spermatozoids attach themselves to and ultimately pierce the spores, and their piercing causes the discharge of a single cell from the pierced spore, which cell belongs to the pileus of the new plant. As I interpret my observations, this process is carried on upon the gills themselves, as shown in fig. 1, and at the time of the perfect maturity of the fungus, at least in Coprinus, in the subgenus Volvaria, in the ordinary mushroom, and in such plants as have fallen under my notice. The basidia with their spicules and spores, the cystidia germinating and bearing spermatozoids, and the first cells of a new plant (E), are all shown in position in fig. 1.

*Agaricus lacrymabundus* (Fr.) is a very different plant from *Coprinus radiatus*. It is one of our commonest Agarics of the autumn, and is usually found in damp pastures and about stumps. It bears a considerable resemblance to the common mushroom, and is without doubt often gathered for the table in mistake for that species, but whether with any ill effects or not I am unable to say. The most striking character of this Agaric resides in its gills, which are always furnished with a white edge, which drips with semi-milky tear-like drops. Why this singularly good character is not given by Berkeley in his "British Flora," or his "Outlines of British Fungology," or by Dr. Cooke in his more recent "Handbook," I cannot say. Indeed, Fries himself (whose species it is) does not advert to this salient charac-

ter in his "Systema Mycologicum," or in either editions of his famous "Epicrisis." In the "Monographia Hymenomycetum," Fries, however, says, in reference to the gills of this plant, "acie albicante et jove udo plorante."

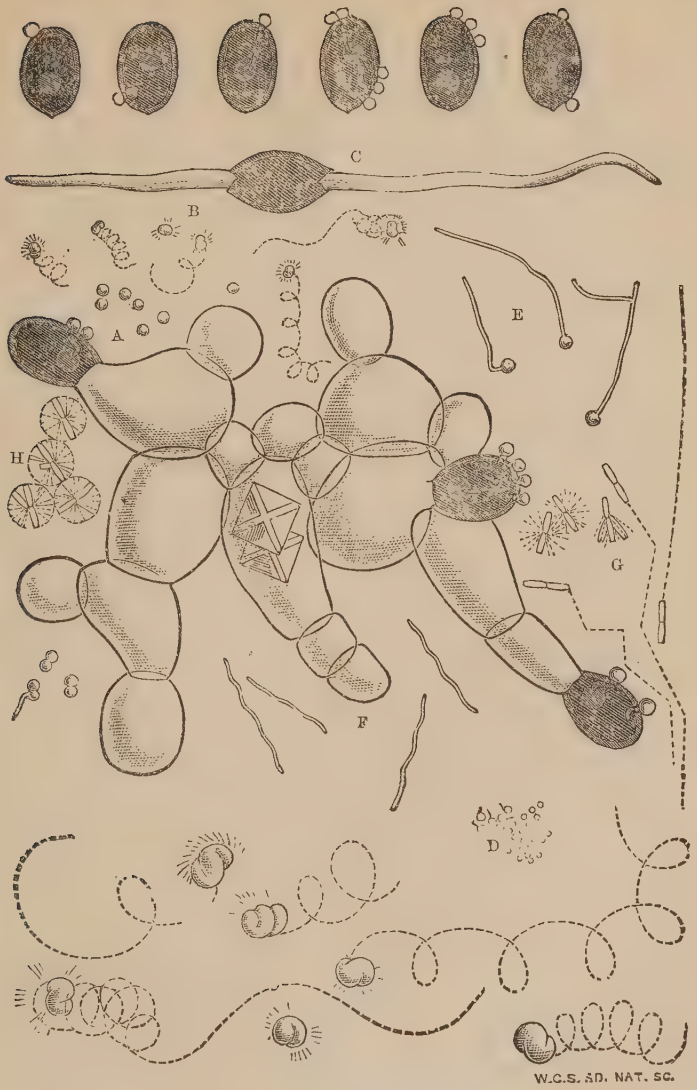
Part of a section of a specimen of *Agaricus lacrymabundus* is shown at E, Pl. CXXXII., with the characteristic drops *in situ* on the gills and upper portion of stem, F G. The drops are shown towards the edge of a gill enlarged 100 diameters at H, above which may be seen several drops of a smaller size, which may or may not at length coalesce with the lower drop. These drops invariably dry up on the edges and surface of the gills. As far as I know, milky tears peculiar to *Agaricus lacrymabundus* have never been minutely described, neither has an account of any microscopical examination of them been hitherto published.

These drops are distilled direct from the cystidia. When the fungus reaches maturity the cystidia protrude boldly from the surface of the hymenium, as seen at C; and the apex of the cystidium opens exactly as does the ascus in Peziza. At first the cystidium is filled with a thin fluid in which no granules can be detected; but at length a large vacuole is formed at the base of the cystidium, and the contents are forced towards the apex: here the fluid becomes partly differentiated into granules, and at length the cystidium opens at the top and discharges its contents. The protruded drop now swarms with moving atoms of a regular size, which I refer to spermatozoids. They are in every way identical with the spermatozoids of *Coprinus radiatus* (Fr.).

In my recent paper on the reproduction of *Coprinus radiatus* I adverted to the fact of the cystidia falling bodily away from the hymenium, and exactly the same phenomena holds good in *Agaricus lacrymabundus*; for if a drop of the liquid from the gills is examined under the microscope it will be seen to swarm with free cystidia which have dropped into the fluid from the gills; this liquid not only abounds with spermatozoids and systidia, but it also swarms with spores which have fallen away from the basidia, as seen in Pl. CXXXII.

If the spores which have fallen into the drop are examined, they will be found to be very different in aspect from the spores as they are seen upon the basidia; for whilst the spores in the latter position are perfectly plain in outline, as seen at J, enlarged 2,000 diameters, the spores within the drop are studded all over the surface with the spermatozoids discharged from the cystidia. Not only are the spores studded as shown at K, but they are pierced through the external coat by a fine thread protruded from the spermatozoid. The effect of this is that a single free cell is soon after discharged from the spore, and this

Fig. 2.




Coprinus radiatus. Fr.

Spores pierced by Spermatozoids; unpierced Spore germinating at both ends; infant plant and infusoria enlarged 1,000 diameters; Spermatozoids at bottom of plate further enlarged 3,000 diameters.

floats about in the drop, leaving the exospore quite empty. This single transparent cell, which is three or four times the size of the original spore, and is the first cell of the pileus of a new plant, is in its turn commonly attacked and pierced by the spermatozoids. Sometimes a spore is surrounded and pierced by a large number of spermatozoids, whilst at other times it receives the attack of one body only; this is, however, sufficient, for I have frequently seen the first cells discharged from the orifice made by a single spermatozoid, and the latter body again pushed out by the cell. The spermatozoids which have a single turn of a spiral revolve rapidly, and, when they come in contact with a spore, not unfrequently creep with an amœba-like movement over the surface, before they discharge their contents into the protoplasm of the spore. These bodies, as seen in *Coprinus radiatus*, are shown in the accompanying figure, enlarged to 1,000 and 3,000 diameters, and they are precisely the same in *Agaricus lacrymabundus*. When the spermatozoids of the latter species emerge they are dark brown in colour, and here they resemble the spores; the at first colourless contents of basidia and cystidia alike become at first differentiated and then oxidised on exposure to the air. In a minute species like *Coprinus comatus*, where the growth of the plant is very rapid, and hundreds of generations are produced in one season, new plants are rapidly reproduced from the spores, and the growth can be watched; but in *Agaricus lacrymabundus* the case is very different, for it is probable that it would take many months (if not a whole year) to grow a perfect fungus belonging to this species from the spores. It must also be remembered that although this Agaric produces many millions of spores, yet the plant does not increase in actual numbers; for if all the spores produced plants, then in one year the world would be covered with this species only. For one spore which grows, hundreds of millions must be failures. In a former paragraph reference was made to bodies intermediate in form between cystidia and basidia, and bodies of this nature are common on the upper part of the stem in *Agaricus lacrymabundus*; they are shown on the natural size section at G. The bodies in this position secrete and distil a semi-milky fluid, which they excrete in drops, which drops are invariably dotted all over the upper portion of the stem. It must not be thought that this distillation is peculiar to the species under notice, for it is a character (though till now unpublished) of whole sections of Agarics. For instance, certain groups coming under Tricholoma are described by Fries as "lamellis decolorantibus, rufo-maculatis l. cinerascentibus." Now these brown spots on the gills, when examined under the microscope, are seen to be produced by a liquid which changes colour, and which is distilled

from the cystidia; and it is quite possible that the same phenomenon holds good in many other fungi, as in the tears of *Merulius lacrymans*, and in the drops found upon such species as *Polyporus dryadeus*, *P. hispidus*, *P. cuticularis*, and many others. It seems probable that in some species this liquid, which by a differentiation produces spermatozoids, also sends the spores into a temporary resting condition, and that the spores rest before germination, just in the same way as many seeds rest. This would explain the great difficulty of getting some fungus-spores to germinate. Under any circumstances diverse fungus-spores resemble seeds in the fact of some germinating at once, whilst others will not germinate till long periods of time have elapsed.

On examining the semi-milky drops as seen on the stem, I have been unable to observe any production of spermatozoids, but these intermediate cystidium-like bodies are expelled from the stem and fall into the drops of moisture distilled. This is a state of things to be expected, for as these bodies belong to neither basidia or cystidia, they are as a consequence quite as unable to produce spermatozoids as spicules and spores. In Agarics and Boleti the stem may be considered as a mere barren hymenium; when the stem is striate (as it commonly is), these striæ represent the absent gills; in species with decurrent gills, the fruiting surface (as in *Agaricus prunulus*) sometimes quite reaches the ground. When the stem in Boletus is reticulated, the reticulations represent the absent tubes, so that it should be a matter of no surprise to find organs pertaining to the hymenium upon the stem. The external surface of the pileus, for the same reason, often bears besidia and spores, and the stuffed stem and cartilaginous bark answers to the trama and hymenial surface. An Agaric or Boletus with the pileus and gills arrested would answer to a Clavaria bearing fruit all over the club, and abnormal Agarics are sometimes found in this condition, whilst the simplest form of *Hymenomycetes* is where a merely filmy hymenium is developed, as in Hymenula.

When it is remembered how innumerable are the myriads of spores and spermatozoids set free every autumn, and how probable it is that hybrids of every degree are produced from these bodies, the diverse and almost countless forms seen in the mushroom-tribe quite cease to be a matter of wonder. Without doubt the spermatozoids of some species commonly pierce the spores of an ally, and so produce plants intermediate between one species and another; such forms are an everyday experience with fungologists and lichenologists, and the more one knows of species as species the greater are the difficulties to be surmounted in correct naming. Fries himself says, under Mycena, that he has only given the best marked species, and

that he knows in his mind many other apparently distinct forms and species which he has never published. Our cryptogamic floras require cutting down to at least one-fourth of their present dimensions by some competent botanist, who is well acquainted with species. In the majority of instances the species are so ill defined that it is the easiest possible matter to gather plants which it is simply impossible to refer to any described fungus, simply because the specimens gathered belong to none.

The spore, as found amongst Agarics, I consider female in the sense of its pertaining to the female in the same way as an unimpregnated ovum may be considered a female organ whilst still attached to the mother, and the spermatozoids male, as pertaining to the male in the same way as spermatozoids are always the direct offspring of the male (as ova are of the female). When the spore is pierced by the spermatozoid, the former is capable on germination of producing either or both sexes. If these views are correct, a term is required for the unpierced spore synonymous with the ovule in flowering plants, as distinguished from the seed; and the old term sporule might well be used for indicating the unpierced spore. The spores in *Agarics* must be considered very different in nature from gemmæ, or buds, and they are totally different from the conidia or conidio-spores of Penicillum and the acro-spores of Mucor. The latter may reasonably be compared with the bulbils of Dentaria, and some Liliaceæ; but the nature of the basidio-spores (and of the hymenium which carries them) points to a very different conclusion. It is a very common thing for the mycelial threads of all sorts of fungi to break up into bead-like conidia, and as these conidia or secondary spores have a certain reproductive power, there is here certainly a slight analogy with gemmæ. The spores and spermatozoids in the Agaracini appear to me to have a strong analogy with the oosphere and spermatozoids of *Fucus vesiculosus*, the cystidia having an analogy with the antheridium in the same Alga. I have expressed an opinion elsewhere that Van Tieghem's idea of male and female spores in the Agaricini is altogether untenable; such a thing as a male ovum or spore is as unreasonable as a female spermatozoid or female pollen-grain. Seeds of all sorts are capable, on germination, of producing either or both sexes, though it is common enough to see one sex exalted at the expense of another. Even in the highest mammals the males have a trace of the female in the subordinate mammæ and other characters, and similar characters which show a trace of the male are found in most female animals.

In the vegetable kingdom nothing is more common than to find so-called male or female plants changing their characters. Males will, under altered conditions, carry female organs, and

females will produce anthers and pollen, which conclusively shows that not only are ovules, spores, seeds, and eggs not in themselves male or female, but the produce itself of these eggs is inherently hermaphrodite. It is convenient to name many animals and plants "male" and "female," because they are almost but not entirely so. Even in the case of the Equisitaceæ, Sachs is obliged to qualify his terms of regarding these plants, and say that on the germination of the spores "the prothallia are, *in general*, diœcious" ("Handbook," p. 363). And on Ferns the same qualification of terms is found, for under the latter head he says (p. 343): "The prothallia *show a tendency* to be diœcious."

Several papers have been published of late on the reproductive process in the *Basidiomycetes*, and the writers of these papers have noted (with me) the diverse mycelia seen amongst the germinating spores; but I am convinced that the threads which produced antherozoids, as seen by Van Tieghem, came from the cystidia and not the spores. When a mass of spores and threads are seen in a solution of horse-dung, nothing is more difficult than to decide for certain whether the threads really come from the spores or not, and the spores of *Coprinus radiatus* could not possibly have been "sown" on any decoction without cystidia likewise falling upon the liquid. The "rod-like" bodies described by Van Tieghem read remarkably like an illustration of the well-known fact of the threads of many fungi breaking up into Bacteria at the tips. In the many Agarics I have examined, it invariably happens with me that after a spore is pierced it discharges a single cell, which developes directly into a new individual, exactly as is seen in Chara, but an unpierced spore may produce a thread of indefinite length; now if this thread is attacked by the spermatozoids, it will in its turn produce this single primordial cell of a new fungus, or if the mere undifferentiated liquid contents of the cystidium should pass over the thread from an unpierced spore, it there gives rise (at the point of contact) to the primordial cells.

The persistence of form in spores, and especially the pierced spores, under extraordinary conditions, is something remarkable; for instance, repeated violent boiling has no effect on the form and colour of the spore, and in the cases where the spermatozoids are attached no amount of boiling disengages them; if anything, the boiling seems to make the piercing more distinct to the eye. I do not find conidia or gemmæ resist boiling in this manner, and certainly no bulbil or bud from a flowering plant would maintain its form under these conditions. As for the unpierced spores, I believe their life to be of the very shortest duration (not twenty-four hours), but after piercing the life remains, just as we find life slight in an ovule but enduring in a seed.

Dr. Max Reess has recently published an account of *Coprinus stercorarius* (which is a rare species and not British) in Pringsheim's "Jahrbücher," in which he has described and figured a sort of Carpogonium (or Ascogonium), a female organ said to be produced at the ends of mycelial threads. This organ, according to Dr. Reess' figures, would appear to be furnished, or not furnished, or doubly furnished at the apex with a trichogyne, an organ into which the spermatozoids discharge their contents. This trichogyne, according to Sachs in describing the Algæ, is "a long thin hair-like hyaline sac, which serves as a receptive organ, and springs from a structure which iscalled the trichophore. This latter is a body usually consisting of several cells, in or near which the results of the fertilisation become apparent, cell-filaments or masses of tissue shooting out near or beneath it, forming the receptacle, here termed the cystocarp, in which the spores are subsequently formed. In one genus (of Algæ), *Dudresnaya*, the process is still more complicated, inasmuch as the tubes first spring from the trichophore, which occasion the formation of the cystocarps only after conjugation with the terminal cells of other branches." The Carpogonia, as figured by Dr. Reess, remind me of a number of spores agglutinated together with spermatozoids still attached, exactly as similar agglutinated companies of spores may be always washed from the dry brown spots on *Agaricus lacrymabundus* or the various brown-spotted Tricholomata. I am disposed to fall in more or less with Dr. Reess' views, although I do not know the species he has worked upon. The single primordial cell which I have seen expelled from the spore of *A. lacrymabundus* and then pierced by spermatozoids before going into a resting state must be of the nature of a Carpogonium. The spores commonly put on an appearance similar to that figured by Dr. Reess, but anything referable to a tricogyne I have not seen.

Dr. Eidam has also recently published an illustrated paper on the reproductive process in the Agaricini in the "Botanische Zeitung" for the 1st and 8th Oct. last. Unfortunately, Dr. Eidam's paper has reference to *Agaricus coprophilus* (Bull), a rare Agaric in this country, and one almost unknown to me. Here, at fig. 12, Pl. VIII., a Carpogonium is again suggested, but Dr. Eidam very properly and reasonably attaches a note of interrogation to his interpretation of the figure. At the ends of certain threads Dr. Eidam figures what he terms spermatia, which, though somewhat different in shape, are identical in size with the bodies I term spermatozoids. My spermatozoids are at first globular, fig. 2 A, then somewhat elongated from the unfolding of one turn of a spiral B; and these bodies, with me, although often produced direct from the cystidium itself, are quite as often produced at the end of a long thread given out

from the cystidium. With me, I find the unpierced spores to burst at one or both ends, fig. 2 c, exactly in accordance with Dr. Eidam's figs. 1, 2. The ruptured end of the exospore from which the threads emerge are shown in my fig. 2 c, and are uncommonly well shown in Dr. Eidam's figs. 1, 2. In Dr. Eidam's plate the two orders of threads are well shown, but I am perfectly convinced that the second order of mycelial threads which bear the spermatia do not belong to the spores. These latter threads are shown by Dr. Eidam to a larger scale than the threads from the unpierced spores, and there are only three spores shown in connection with the spermatia-bearing threads. Now, although these three latter spores are shown to nearly double the scale of the other spores, yet in each case *the wall is shown unbroken*. This is simply because the walls belonging to these spores are correctly shown in the plate; the threads do not come from the spores (which have been merely accidentally washed against the threads), but from the fallen cystidia. In this plate there are no less than sixteen spores producing threads without spermatia, and *in every instance* the spores are then shown as *ruptured*. I am quite disposed to acquiesce in the correctness of Dr. Eidam's observations as regards the spermatia, but the spermatia-bearing threads are from the cystidia. Fig. 12 can hardly be a Carpogonium; it disagrees with Dr. Reess' figure and description, and quite accords with what I have seen of the terminal condition of a cystidium-thread when the contents are about to become differentiated. My impression is that any Carpogonium in the Agaricini must be a pierced spore or an agglutination of pierced spores. These spores or companies of spores may rest for longer or shorter periods, and the cells and mycelium when at length produced is then analogous with a subterranean rhizome, capable of producing new plants from buds.

It will be observed that the notes on both the species last referred to, as well as my notes on *Coprinus radiatus*, bear upon dung-born species of rapid growth. As dung swarms with fungi and infusoria of all sorts, the greatest care is necessary in experiments, or Bacteria will be mistaken for Spermatia, and Sphærobacteria for Spermatozoids. To clear up some little of the confusion which might arise as to all these bodies, the infusoria are engraved in fig. 2 to the same scale as the spores and bodies referred by me to spermatozoids; A shows the globular spermatozoids as they are at first produced within the cystidium, or within the end of a thread more or less long, protruded from a cystidium: these bodies are at first motionless, but after being kept in liquid for a few hours they begin to slowly revolve; this movement keeps on for several days, and is all the time accelerated, whilst the body (formerly spherical) now becomes slightly

elongated, and a single turn of a spiral is seen as in the larger figures shown at the bottom of the plate; the dotted lines indicate the whirling motion of the spermatozoids. For comparison with this, various tailed and tailless monads are engraved at D, which figures may be compared with the spermatozoids to the same scale on the upper part of the plate. These latter bodies have been long known, and Mr. Berkeley, in the "Micrographic Dictionary" (last edition), p. 20, says: "The bodies called cystidia or pollinaria are globular or oval cells, found associated with the basidia, containing granular matter, exhibiting molecular motion when discharged." In common with many other botanists, I am inclined to think this movement to be other than molecular, as the eddy clearly seen round the revolving bodies indicates the presence of cilia. It is impossible to believe that *life* can spring from *no-life*, the mere molecular movement of lifeless particles must be of a totally different nature from the life-movements of spermatozoids and infusoria. The revolving bodies might be referred to Micrococcus, one of the Sphærobacteria, but it must be remembered that they are the differentiated contents of the cystidia. It may be answered that if the mycelial threads of fungi will break up into true Bacteria, why may not the cell contents reappear as one of the Sphærobacteria? The question then arises, What is the nature of the obscure bodies referred to Bacteria? Are Dr. Eidam's spermatia no other than Bacteria? they are sufficiently like Bacteria. Are certain so-called Bacteria and antherozoids of some cryptogams one and the same? When once produced they are both very persistent, and they are both produced under somewhat similar conditions. The spermatozoids of Agarics only appear as the fungus has just passed maturity, and as decomposition is setting in; and as soon as the spermatozoids are set free, then the material from which they spring has vanished.

It is just worthy of note that certain spermatozoids and bacteria resemble each other in size and external form, that they are alike in being furnished with flagella or cilia, that they are produced at a time when decomposition is just setting in, and that they are seen in semi-milky fluids. The spherical bodies, when they become attached to the spores, or even threads, rupture at one end and discharge a fine thread, as at E, where they are shown germinating in a free state, which is no uncommon occurrence. Vibriones are shown at F; these bodies, with the bacteria, shown at G and H, are well known to all microscopists, and it has appeared to me that they are mere differentiated states of the old cells of the fungus which have broken up and (as a collection of cells) totally disappeared. The dotted lines indicate the movements of the bodies, whether straight, zigzag, or revolving like a wheel.

Whether the fertilised spores are able to withstand great vicissitudes of temperature and still not lose their vitality is unknown, but if other living atoms are able to live in boiling fluids, or be frozen and still live, it should be a matter of no surprise to find fungus-spores passing unscathed through similar ordeals. It is reasonable enough to imagine life to be maintained under extraordinary conditions, but to me most unreasonable to imagine life to spring from that which is without life.

As the cells of decomposing fungi disappear, various infusoria at the same time swarm into being and take the place of the collapsed cells. On violently boiling these infusoria in test-tubes along with fragments of putrid fungi, for five minutes, and sealing at the highest point of ebullition, I find the infusoria, after one or two or three months, to be still alive. During this time putrefaction is arrested in the test-tubes, the decayed fragments of fungi remain the same, and the infusoria remain inert. On opening the flasks the infusoria are at first motionless, and life is apparently at a low ebb, but the individual infusoria, as watched under the microscope, rapidly regain their accustomed activity, and in a few hours are as full of life as if they had never been boiled. The decomposing fragments of fungi now rapidly give the fluid an offensive odour.

Whilst able to resist the heat of boiling-point, these same infusoria are equally well able to resist cold, for during the frosts of the past month I froze decoctions of fungi containing infusoria into solid blocks of ice for a whole week. On thawing, after this time the bacteria, vibriones, monads, &c. were as full of life as before freezing.

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## EXPLANATION OF PLATE CXXXII.

Fig. 1. Vertical section through gills and stem of Agaricus (*Hypholoma*) lacrymabundus (Fr.). E, Veil. F, drops on gill. G, drops on upper part of stem, natural size.

Fig. 2. Vertical transverse section through edge of gill, with drops *in situ*. Enlarged 100 diameters. A, Trama. B, Cells forming Hymenium. C, Cystidium. D, Basidium. H, lowermost drop, containing cystidia and spores.

Fig. 3. Cells of Hymenium. C, Cystidia, containing spermatozoids. D, Basidia, with spores attached, and triangular flat crystals from the juices of the plant. Enlarged 500 diameters.

Fig. 4. Spore unpierced by spermatozoids, enlarged 3,000 diameters.

Fig. 5. Spore pierced by spermatozoids, from a drop which had dried on the surface of the Hymenium. Enlarged 3,000 diameters.

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# REPRODUCTION IN COPRINUS RADIATUS.

By WORTHINGTON G. SMITH, F.L.S.

*Plates* 54 to 61.*

For the purpose of minute research into the vital phenomena of the Mushroom tribe, *Coprinus radiatus*, Fr., possesses many advantages over the other species of the large order to which it belongs. The first great advantage peculiar to *C. radiatus* is that it grows readily and abundantly on dung heaps from April to December, and it comes up equally well in town and country. The second point in its favour is that it is so small and transparent that every part can be quickly examined, and an entire plant kept under the covering glass of the microscope. The third advantage found in *C. radiatus* rests in the fact of its whole life being so exceedingly short that its entire vital functions are performed in a few days. Having these points in view, I have, during the whole of the present summer and autumn kept up a large bed of fresh horse-dung in my garden, and from this bed I have narrowly watched the growth of many generations of the plant I am about to describe.

A complaint is often made by persons unused to the microscope, and to the appearances of objects as seen by its aid, that it is impossible to see the real objects as they are represented in drawings. To a certain extent this is borne out by facts, for a drawing is never meant to represent what may be accidentally seen at one sitting, but is designed as a summing-up of all that has been seen during many hundreds of sittings. Any one looking for the first time through a good telescope at Jupiter's moons, Saturn's rings, or the planet Mars, might be a little disappointed in the apparent smallness and lack of strongly marked outlines in the objects seen; but this does not detract from the correctness of astronomical diagrams, which are only matured after many patient observations. No one expects to see the solar system as shown in a model, or the country as seen on a map.

It may reasonably be premised that the facts observed in connection with the life history of *Coprinus radiatus* will more or less apply to all the other species belonging to the Mushroom tribe; but it would be impossible to make the observations here recorded on the more fleshy species, because, instead of days, these latter plants take months to mature. In *C. radiatus* generation after generation keeps springing up in almost daily succession, but in the more fleshy species, exclusive of

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*Coprinus* and *Bolbitius*, I am convinced there is, as a rule, but one generation in the year. The *Agarics* of the autumn spring up from the mycelium formed during the fall of the previous year, and this mycelium has rested in the ground for twelve months. In digging up old pasture ground, or the dead leaves of an autumn which has passed, mycelium in a resting state is invariably found. There is no such long rest with the mycelium of *Coprinus radiatus*, for so long as the weather is not too dry, too wet, or too cold, the fungus goes on perfecting itself day after day without ceasing. During hot, very wet, or frosty weather the spawn lies buried, and it rests in the warm, moist dung for short periods of time only.

*Coprinus radiatus*, Fr., is one of the dung-borne Agarics with a cap which measures from an eighth to one quarter of an inch in diameter, and this filmy pileus is supported on a stem, which on an average measures from a quarter to three-eighths of an inch or more in height (Pl. 54A and 55A). The whole cap is a mere transparent film, and the fragile stem is like an atom of gossamer thread. A breath will totally break down and collapse every part of the plant, whilst a heavy dew or slight shower of rain will destroy a whole colony. These minute Agarics can only be gathered with the aid of small forceps, for if they are taken in the fingers they at once collapse, become liquid, and vanish. So little moisture does a single specimen contain that it is lost in the moment or two consumed in taking it for examination from the garden to the house. The young plants may generally be seen dotted over the dung, like in size to so many pins' heads (Pl. 55B), and from this, the infant state, to maturity, the growth of the fungus is very rapid. At seven or eight in the evening nothing but immature plants can be seen (Pl. 54C, D, enlarged 20 diameters) ; about eleven or twelve a rapid growth commences, and by two or three o'clock in the morning perfect maturity is reached. If the morning is moist the plants will remain in perfection till nine or ten o'clock, but if it is dry they will not last after five or six. On shady roadsides or in dark places the time required for growth may probably be a little more or less, but the present observations apply to the plants as found growing on dung in a light and open place.

To get a good view of *C. radiatus* it is necessary to magnify it at least from 50 to 100 diameters; the nature of the stem and gills can then be made out, and all the individual component cells be clearly seen.

Mature plants are figured at E, F (Pl. 54), enlarged 10 and 20 diameters, the first showing the nature of the outer surface of pileus, with its furrows, and the other the lower or fruiting surface, with the nature of the gills, and the collar formed by them near the insertion of the stem. At G is shown the relative number of the basidia or privileged cells, which carry the naked spores, and at H the relative number and position of other privileged cells, termed cystidia. To these latter bodies I shall presently refer more

fully, and they are merely adverted to here that some idea may be formed of their great number. At I is shown a transverse section through the cap of the fungus, a short time before expansion (when the umbrella-like top is down), to show that the hair-like stem is hollow, and that the plant in infancy is enveloped in a complete veil or bag, the presence of which is shown by the ring of cells and hairs which forms the circumference of the diagram.

For a proper comprehension, however, of this minute fungus much more than a superficial examination is necessary, and the first thing to be done in the way of dissection is to secure a good longitudinal section of the fungus from top to bottom, as shown in Pl. 55 (J)—this enlarged 35 diameters, at once shows the immense number of cells which go to make up one of the fugitive little plants belonging to *Coprinus radiatus*. By reference to the figure it will be seen that the stratum of flesh which forms the pileus is only six or seven cells in thickness, and the external surface is covered with a few hairs of different sizes (the remnants of the universal veil or wrapper) some of the smaller hairs being tipped with a gland. Another good vertical segmental section across the cap and gills will show the appearance of the plicato-radiate outer surface of the pileus to be caused by a series of cracks which are brought about by the necessarily sudden expansion of the cap, which act of expansion tears (in these positions) the component cells of the pileus apart, Pl. 54E, and Pl. 55K. A transverse section through the fungus when in an infant state shows the commencement of these fissures, as at Pl. 54, I, and Pl. 55, L. The gills have no trace of a trama—the so-called trama being the cells which form the substance between the hymenium in the gills; if present this substance would be at M M., Pl. 55, but one of the characters of the genus *Coprinus* is that the gills have no distinct intermediate substance in the gills. In the plant under examination the lamellæ or gills are free from, and form a collar round the stem (Pl. 55, N), and are only about seven cells in thickness.

Good sections down and across this stem when young will show it (gossamer like as it is) to be piped or hollow from top to bottom (Pl. 55 O), and the hairs seen at the base (P P) are the torn remains of the veil or wrapper which once held the edge of the pileus (Q) down to the base of the stem. In this figure several spores may be seen at the base, carried up amongst the cells of the stem. On looking at an entire plant of *C. radiatus* in this way under a low power of the microscope it appears to be formed of a few thousands of cells only, but if these cells are now measured and counted, which is by no means a difficult matter, it will be found that instead of thousands it really requires millions of individual cells to build up one of these minute plants which a breath destroys. The smallness and lightness of one fungus is such that it requires 150 specimens to weigh a grain, or 72,000 to weigh an ounce troy. In the type specimen of *C. radiatus* now figured there were 22,560,000 cells in its structure irrespective of the

spores, which numbered about 3,200,000 more. If all these cells and spores are only equivalent to the hundred-and-fiftieth part of a grain, it follows that in an ounce of fungus cells there must be no less than one billion six hundred and twenty-four thousand millions of these bodies, exclusive of the spores. In a large Mushroom the cells would number hundreds of billions. Still more wonderful is the fact that each individual cell is furnished with a spark of life, contains water, protoplasm, and other material, and is capable of growth and assimilation.

The purpose of this essay is to demonstrate something of the life history of the minute but truly wonderful fungus now before us; and with this object in view it is not only necessary to use the higher powers of the microscope, but to patiently watch the fungus and its changes at every hour (almost minute) of the night and day and for several days in succession.

In the vertical section of one of the minute gills, as shown in Pl. 56, magnified 150 diameters, the whole fruiting and reproductive surface of the fungus is seen at a glance. The nature of the furrows in the pileus (R) is now perfectly clear, every cell being seen in position, and the remnants of the universal veil or wrapper are seen on the surface of pileus at S. Studded amongst the cells of the upper stratum of cap may be seen various brilliant crystals which belong to the ammonio-phosphate of magnesia, and which crystals are taken up by the fungus from the manure on which it grows. Many dung-borne Agarics are covered with so-called micaceous particles, which, in many instances, doubtlessly arise from the manure which supports the fungus. It is a matter of considerable difficulty to get a section like this, for if attempted clumsily no result will follow beyond a slight discoloration of the edge of the lancet; it is necessary to take the slice at the exact moment of maturity, and even then it requires the perfection of dexterity to cut the fungus properly, as the plant is sticky in all its parts. A fragment of the fruiting surface of a gill is shown at T.

To understand the vital phenomena of *C. radiatus* it is necessary to comprehend the meaning of the bodies seen in Pls. 56 and 57. The whole fungus is built up of cells, which run parallel with each other (and at maturity are very long) in the stem (Pl. 55), and which spread laterally, and then become more or less spherical in the pileus. When these cells reach the gills or fruit-bearing surface (hymenium, U U), a certain differentiation takes place in their functions. The majority of the cells remain simple, but certain other cells which are spread over the gills with the greatest regularity assume a different nature, and produce spores. These cells are called basidia (meaning small pedestals, v v, Pl. 56 and 57), and the spores, or analogues of ovules or seeds, basidio-spores, because they are carried on these little pedestals. The minute threads between the spores and their pedestals are er med spicules or sterigmata (literally props). Certain other

privileged cells (w w, Pl. 56) are termed cystidia (bladders), and around these latter organs and their meaning the principal interest of the subject in hand will now centre. But let it be borne in mind as a preliminary fact of the utmost importance that at first the fungus is composed wholly of simple cells which show no differentiation; no differentiation in the cells is seen in infancy when thegills are first formed, but the privileged cells, known as basidia and cystidia, come only into existence and that simultaneously as the plants reach maturity. This differentiation I consider to be sexual, the basidia being female, and the cystidia the male organs. When the contents of the basidia and cystidia are interchanged, the result is a return to another series of cells, which go to form a new plant. I am perfectly aware of the opinions which have been expressed by other botanists (and to which I shall return), but it is not so much my aim to make my observations accord with what others have said, as to record what I have seen myself, and to give my own interpretations of the phenomena seen, irrespective of what has been said or done before.

The first sign of differentiation in the simple cells of the gills, when the basidia and cystidia are about to be produced, is in the privileged cells becoming glossy, crystalline, and translucent; they both appear to secrete a material which makes them conspicuously brilliant. Each basidium then throws out four slender branches, the tips of which gradually swell and form spores. The cystidia (w) are more sparingly produced (for their number in this species see Pl. 54, H. and Pl. 55, Q), and at first cannot be distinguished from the basidia, though they are frequently larger in size; they are commonly granular within, and are in many species, as in the one before us, crowned with granules, w (Pl. 57, x), but sometimes they bear four spicules, and this latter condition has led some botanists to consider the cystidia to be barren basidia, but that they are really cystidia with spicules is proved by the following fact, which I believe to be somewhat new. In moisture, as supplied by the expressed juice of horse dung (or even distilled water) these spicule-bearing cystidia germinate at the four points of the spicules, and produce long threads, which bear at their tips the granules so frequent in typical cystidia (Pl. 57, y). The cystidia are moreover furnished with spicules in the subgenus *Pleuteus*. The germinating cystidia are seen in several places at w, Pls. 56 and 57, and the granules at x, y. On the top of Pl. 57 is seen a section of a gill with all the bodies in position enlarged 350 diameters, whilst on the lower part of the cut may be seen various germinating cystidia to the same scale as seen on the surface of a gill. The granules at y, which are at first not capable of movement, are really spermatozoids possessed of a fecundative power, but to see this power brought into operation considerable care and patience and the higher powers of the microscope are requisite. In certain other of the Agaricini, the protoplasmic contents of the

cystidia are at times discharged from one mouth only, and that at the apex of the cystidium.

Before quitting Pls. 56 and 57, I may say that when a slice, as represented in fig. 56, is placed under a covering glass in a drop of water, all the cells totally collapse and perish, so that in three or four hours not a vestige remains, but the same drop of water which destroys the old cells instils life into the granules or spermatozoids, which after the lapse of a couple of hours begin to revolve, and ultimately swim about with great rapidity. These spermatozoids attach themselves to the spores, pierce the coat, and discharge their contents into the substance of the spore. From twenty-four to forty-eight hours after this the spore discharges a cell which soon becomes free, and this is the first cell of the pileus of a new plant which rapidly produces others of a like nature (z, Pl. 56). Now the same water which had the effect of immediately collapsing and destroying the old cells, has quite a different effect on the new cells as discharged from the fecundated spore, for the whole development of the new plant depends upon the constant presence of moisture, expressed juice of horse-dung being perhaps best. A spore unpierced by the spermatozoids is shown producing a mycelium peculiar to itself, at A, Pl. 56.

A spore is commonly considered to have some analogy with a seed, but according to my views its analogy is rather with an unfecundated naked ovule without an embryo, unless the nucleus within the spore may in some way represent the rudimentary fungus; when the spores are formed within sacs or asci, the ascus bears some analogy with the ovary. The cystidium, on the other hand, represents with its granules the anther and its pollen.

The six spores represented on the top of Pl. 58 are magnified 1,000 diameters, and each viscid spore, which is furnished with a nucleus lighter in colour, but with a dark outline, has been pierced and fertilised by one or more spermatozoids, whilst the unfertilised spore at A has burst at both ends, and produced a mycelium of its own. At B may be seen three spermatozoids which have burst after twelve hours in expressed juice of horse-dung, and which have also produced branching threads peculiar to themselves, reminding one of a pollen tube. It is quite possible that these latter threads may help to produce a new plant if they come in contact with the spores. The large figure at C is similar in nature to the group at z, Pl. 56, and represents three fertilised spores which have burst and produced the first minute knot or groups of cells of the cap of a new fungus. These eighteen cells took four days for their production, and the crystals belong to the expressed juice of the horse-dung in which they grew. The spermatozoids as here shown begin gradually to revolve after being kept in liquid for two hours, and the movements last for at least four days. At first these bodies are perfectly spherical, as at D, when they merely oscillate, then they revolve slowly, and as time

goes on, a single turn of a spiral makes itself visible, and the bodies whirl round with great rapidity. At intervals the motion entirely ceases, and then, after a short lapse of time, the gyration is again continued.

Judging from the presence of the eddy round these bodies whilst whirling (E E, Pl. 58) they are possibly provided with cilia, but from the extreme minuteness of the bodies themselves I have not been able to satisfactorily demonstrate their presence. The whirling of the spermatozoids is sometimes so strong that when they attach themselves to the spores they twist them round after the manner of the revolving oosphere in Fucus.

When the cells of the old parent fungus collapse and disappear in the water, their place is in less than two hours occupied by innumerable quantities of bacteria, vibriones and monads, which belong to the infusoria. In these two hours every cell of the pileus has generally vanished. Where these infusoria come from, or how they so speedily come into being, is difficult to say. They may possibly be present in a latent state in the juices of the fungus, but I have invariably found, when a single specimen of *C. radiatus* has been placed on a slide under a covering glass with a drop of water, and this, again, under a propagating glass, that as the millions of fungus cells quickly disappear, so millions of simple infusoria just as quickly come into being. It seems almost reasonable to believe that the fungus cells themselves become suddenly transformed, and reappear as simple infusoria; the change would not be quicker or more remarkable than the rapid production of the purple black spores from the crystalline and colourless basidia.

Be this as it may I have here engraved the abundant infusoria to the same scale as the cells. The tailless monads at F have a rocking Brownian movement, whilst those with tails, G, propel themselves rapidly about after the manner of minute tadpoles. These monads are liable (without care) to be mistaken for the bodies I refer to spermatozoids, from which they are, however, very different. The bacteria are represented at H H, with their various movements (indicated by dotted lines), either straight, zig-zag, or rapidly revolving on a central axis; when they so revolve they cause a miniature vortex amongst the monads and atoms. I have commonly seen one segment move from side to side, as at J, whilst the other segment remained quiescent. I have also seen them bud from the centre, and occasionally they occur with three limbs instead of two, radiating from the central axis. The vibriones are like vegetable screws, and are shown at K. The spores and infusoria neither collapse nor burst in boiling. As for the monads, vibriones, and bacteria, it can hardly be admitted that they are generated spontaneously from inorganic materials; my experiments rather point in the direction that they are only differentiated forms of already living cells. However this may be, my boiling has not

destroyed either vitality or form, and those interested in the subject of spontaneous generation, may possibly read the result of the following experiment with interest. A dozen semi-decayed specimens of *C. radiatus*, swarming with minute infusoria, were boiled in a test tube for five minutes and then hermetically sealed at the highest point of ebullition. At the end of a month the tube was opened and a drop of its liquid contents at once placed under a cover glass of the microscope for examination. Spores, cells, monads, bacteria, and vibriones were all there, but the latter motionless and apparently dead. In fifteen minutes, however, they showed signs of life, and began to slightly move about, in thirty minutes the movements were decided in nearly every specimen seen, whilst in sixty minutes the infusoria darted about with almost the same energy as they did before they were boiled. For a better appreciation of the exact form and gyrations of the spermatozoids they are shown again at the bottom of Pl. 58, enlarged 3,000 diameters. At first it requires long and patient observation to make out the form of these bodies satisfactorily, but when the peculiar shape is once comprehended, there is little difficulty in correctly seeing their characteristic form. The difficulty is something like that experienced by beginners in separating very small and close double stars with a telescope; at first, and sometimes for a long period, only one star can be seen, till quite suddenly the two are made out, and they are seen as two ever afterwards.

It is not uncommon to find the spores of other dung-borne fungi sticking to the specimens of *C. radiatus*, and it is quite frequent to find not only the spores but the perfect asci of certain species of Ascobolus sticking to the under surface, to which position they have been projected from the plants of Ascobolus growing on the dung. I have also seen the eggs of various mites, nematoid worms, &c., carried up amongst the cells, which quite accounts for larvæ being found within the substance of apparently sound fungi.

In the works I am acquainted with there is no mention of the cystidia falling bodily out of the hymenium on to the ground, yet this is the case in several Agarics I have examined, and is so with *C. radiatus*. The spores naturally fall to the earth, and with them the cystidia, and it is upon the moist earth that fertilisation is generally carried out. All botanists will remember Hoffmann's observations, where he has indicated the passage of basidia into cystidia, and his remarks on the upper surface of the ring which grows round the middle of the stem in *Agaricus muscarius*. In this latter position Hoffmann found a quantity of gelatinous knots, from which projected one or more oscillating threads, terminated frequently with a little head, which occasionally becomes detached. My interpretation of these observations is, that Hoffmann lighted upon the fallen cystidia on the upper surface of the ring, where

they were throwing out threads. Hedwig made somewhat similar observations on the ring in Agaricus.

From the condition of the infant plant, as figured on the hymenium, Pl. 56, z, and Pl. 58, c, it is easy to trace the young fungus through the various stages of its growth, as seen at Pl. 59, where the figures are all enlarged 500 diameters, the lower group of cells shows a plant of seven days' growth in the expressed juice of horse-dung. In all these figures it will be seen that crystals and spores are carried up by the cells, and the lower figure conclusively shows that the first cells of the new plant are the large ones which belong to the pileus; indeed, the hairs of the pileus, as here shown, are amongst the earliest cells produced, these hairs and the threads of the mycelium (which is always highly granular near the plant) are almost one and the same in character. In Pl. 59 and in Pl. 60 the infant fungus resembles a Puff-ball, to which it indeed bears a certain natural relationship. The whole plant in infancy is enveloped in a wrapper of cells, the fructification being entirely concealed within. In the lower figure on Pl. 59 may be seen two spermatozoids which have burst, and K K K shows the cells of straw.

When the fungus has made about the number of cells represented on the bottom of Pl. 59, the growth cannot be carried any further beneath a covering glass. Pl. 60 represents on one side the elevation, and on the other the section of the very smallest infant plant it is possible to see with a lens on the dung. The fungus represented is magnified 200 diameters, and the original was about half the size of a pin's head (see A A A sketch in margin). The nature of the hairy coating, which forms the veil, and the cells which are to form the future gills, are here clearly seen. This figure shows the fungus in its Puff-ball condition at the time when the cells are being actively produced. It contains only a small proportion of the actual cells which go to make up a perfect fungus, and represents probably a full week's growth from the spores. How it is the cells have an inherent property of building themselves up into a particular design, no one knows any more than it is known how the fine spark of life is kept up in these cells from one generation to another.

The mycelium now grows in a radiate manner from the base of the young plant, just as a germinating seed throws up a plumule and throws down a radicle. This mycelium being the produce of fertilisation is now capable, under certain conditions, of producing new plants on certain spots on the threads. Spores are now unnecessary, in the same way as fresh seeds are unnecessary where the creeping root-stock of Couch-grass is present. Or the mycelium may go to rest in the form of cords or thick threads, when it is termed Rhizomorpha, or in the form of knots or bulblets, when it is called Sclerotia. A similar state of things is common in many perennial flowering plants, as Convolvulus sepium and Sagittaria

sagittifolia, and they both at first arise from a seed in the same way as a Mushroom arises from a spore. In Mushroom spawn the grower gets a material similar in nature to the root-stock in Couch-grass.

Pl. 61 and last, represents, enlarged 120 diameters, *C. radiatus* a few moments before expansion, when nearly all the cells are present. Most of the cells here shown are, however, only about one-half the size they reach at maturity, and they are not all and every one produced till the exact moment of complete expansion, as I have ascertained by counting the cells of many specimens. This is not to be wondered at, for if the 22,500,000 cells which go to make up one of these minute plants require 14 days for their production, it follows as a necessity that the cells go on multiplying all the fortnight, night and day, at the rate of 1,114 to the minute. It takes about five hours for the spores to be gradually produced all over the hymenium—say from 5 to 10 o'clock in the morning—and as there are upwards of 3,000,000 spores to each plant, they, as a consequence, gradually appear upon the basidia or spore-bearing spicules at the rate of 100,000 every minute.

No sooner has the plant arrived at perfection than that very moment it begins to perish. I have demonstrated that the cells of the pileus and the hairs which form the veil are the first to appear, and so they are the first to disappear. The fine matted hairs which form the veil in Pl. 61, B B B B, are all torn asunder during the few moments consumed in the expansion of the cap, and at the moment of maturity the hairs vanish and the pileus is naked, which nakedness is the first sign of its decay. When the fragile little fungus has at length produced its fruit, and is prostrate and dying upon the matrix from which it sprang, then, as can be seen with patience under the microscope, the cystidia produce spermatozoids which are at first passive and then active; these pierce the spores and cause the discharge of the first living cell of the pileus of a new plant. It will be seen from these observations that *C. radiatus*, though one of the most minute and fugitive of all the Mushroom tribe, is yet as completely perfect in all its parts as any of the larger and higher species of Agaricus. It must not be supposed that these observations can be followed without close attention and the utmost patience. All the 3,000,000 spores of the fungus do not grow and make new plants, or the world would soon be covered with *C. radiatus*. For every spore that is fertilised and grows there are millions which necessarily perish.

On a dung-heap which will produce *C. radiatus*, other species, as *C. nycthemerus*, &c., are sure to appear; and not only do allied species come up in company with *C. radiatus*, but every intermediate form between one and the other may be gathered any morning. These latter plants belong to no species described as such, but are natural hybrids, doubtlessly produced by the spermatozoids of one plant piercing the spores of another. Amongst the larger

species of Agaricus similar forms are quite common, and they prove sore puzzles for those men who only want *names* for the fungi they find. I am convinced that at least three-fourths of the described species of the higher fungi have no claim to rank as true species, and that plants like Agaricus procerus, A. rachodes, and A. excoriatus, A. gracilentus, with others, are mere forms of one and the same plant with every intermediate link.

Van Tieghem has recently been working on this species, and he has arrived at the conclusion that the fungus produces spores of different sexes. But to me it is quite unreasonable to imagine seeds or spores to be of different sexes. Known facts point quite in the opposite direction, and if sex is once allowed in seeds and spores, then we must be prepared to allow sex in pollen and spermatozoids. A spore or ovule must be considered female, whilst unfecundated or still in the ovary, but when once fertilised it combines both sexes, and cannot be other then hermaphrodite. A secondary colour, as orange (which combines the red and yellow primaries), can never be red or yellow. In dicœcious plants the seeds are capable of producing either sex, and are not themselves male or female, and even the great fleshy root-stock of Bryonia dioica will be male in one place, and if removed to a different position be female. The Rev. M. J. Berkeley, writing of Coprinus (*Gardeners' Chronicle*, April 17, 1875, p. 503), says—"Late examinations of the spores of some Coprinus under germination seem to show that impregnation takes place at a very early period."

Now my observations show that this impregnation often actually takes place on the hymenium itself, the product being a single cell, which in the species now described rapidly developes into a new individual. The spore and spermatozoid may be considered as somewhat analogous with an ovule and a pollen grain, or with what is seen in Chara; or like the escaped oosphore and spermatozoids in Fucus amongst the Algæ.

I cannot attach much importance to Œrsted's interesting paper on the fructification of the Agaricini. His notes are on *Agaricus variabilis*, a plant he gathered from a Mushroom bed. Now, as far as my experience goes, *A. variabilis* is peculiar to dead stems, sticks, and leaves, and does not grow upon dung. Moreover Œrsted experimented upon threads of mycelium taken from dung, and presumed only to belong to this Agaricus; but this mycelium was quite as likely, in my opinion, to have belonged to fifty other things. De Bary, speaking of Œrsted's observation says—"It is impossible not to perceive the similitude between the phenomena seen by M. Œrsted and those I have described in *Peziza confluens*." It is quite doubtful whether or not Œrsted had got the mycelium of some dung-borne Peziza for his experiments, as *P. vesiculosa*, which is always present on dung-heaps.

In the observation of natural phenomenon it is never well to follow, without thought and original observation, in the footsteps of

others. In the case of *Peronospora infestans*, because De Bary said the resting spores were not likely to be found in the Potato plant, it was almost universally accepted as a fact that they never could be there found. Because conidia had not been described, it was commonly believed that no conidia existed. The mycelium of Peronospora has till lately been described as always destitute of suckers, but in some of the Chiswick plants the suckers were abundant. The same fungus is commonly described as having its threads without articulations or septa, but it is equally common to see the figures of this fungus with septa in profusion.

Many botanists, as Corda, Bulliard, Klotzsch, and others, have considered the cystidium in Agaricus to correspond in some way with an antheridium, but as these views have not at present been favoured by Tulasne and De Bary, many botanists seem disposed to agree with De Bary in regarding the cystids as mere "pilose productions of a particular order," which is very indefinite, and the granules as mere conidia (Tulasne). Klotzsch and others have considered it possible that the spores are fecundated by a lubricating fluid given out by the cystidia. This fluid is evidently the same with the threads observed by me, and which at length gives birth to spermatozoids. I consider it quite possible that the mere contact of the threads (or fluid) from the cystidia with the threads from the unpierced spores may be sufficient for the production of a new plant. But De Bary, in criticising Klotzsch, says an opinion of this nature is entirely gratuitous, and the contact and its result, if real, would represent nutrition rather than fecundation, and, as far as he knows, there exists, he says, no other observation on any female organ susceptible of fecundation by the cystidia. I cannot fall in with De Bary's views at all, especially after the analogy found in Fucus and in the confervoid pollen (which has no outer coat), and which exhibits rotation in the flowering plants found under Zostera, Phucagrostes, &c., and which are fecundated when in a state of immersion in water.

As regards the spores of woody species of fungi, they are probably fertilised on the parent plant, and are blown away by the wind in a condition suitable to at once form the first cell of a new plant on any proper habitat. If Agarics were perennial and persistent, instead of being annual and fugitive, we might expect to see a new hymenium produced each year upon the lower surface of the old one, and this state of things really does exist in many species belonging to the perennial and persistent woody fungi of trees, where a new stratum of tubes is every year produced underneath the old one, so that the age of the fungus in years may be correctly ascertained by merely counting the strata. As to the mycelium itself, and the possibility of its producing sexual organs in Agaricus, I have had the subject before me for many years, and have seen many germinating spores, but no trace of any sexual organ other than the spermatozoids as produced from the cystidia

themselves, or from the protoplasmic filaments which they throw out. I am therefore disposed to believe that the absence of sexual organs on the mycelium is owing to the threads being the produce of fertilisation.

As for the expressed juice of horse-dung, it abounds with nematoid worms, spores, and infusoria of many kinds—no drop can be examined from a dung-heap after a shower of rain without seeing large quantities of these organisms. Therefore, any uncertain thread taken for examination from dung is sure to lead to error. All my experiments were carried out in duplicate, one with expressed juice and the other with distilled water, with very little difference in result, as the new plant seemed to live principally on the remains of the old parent.

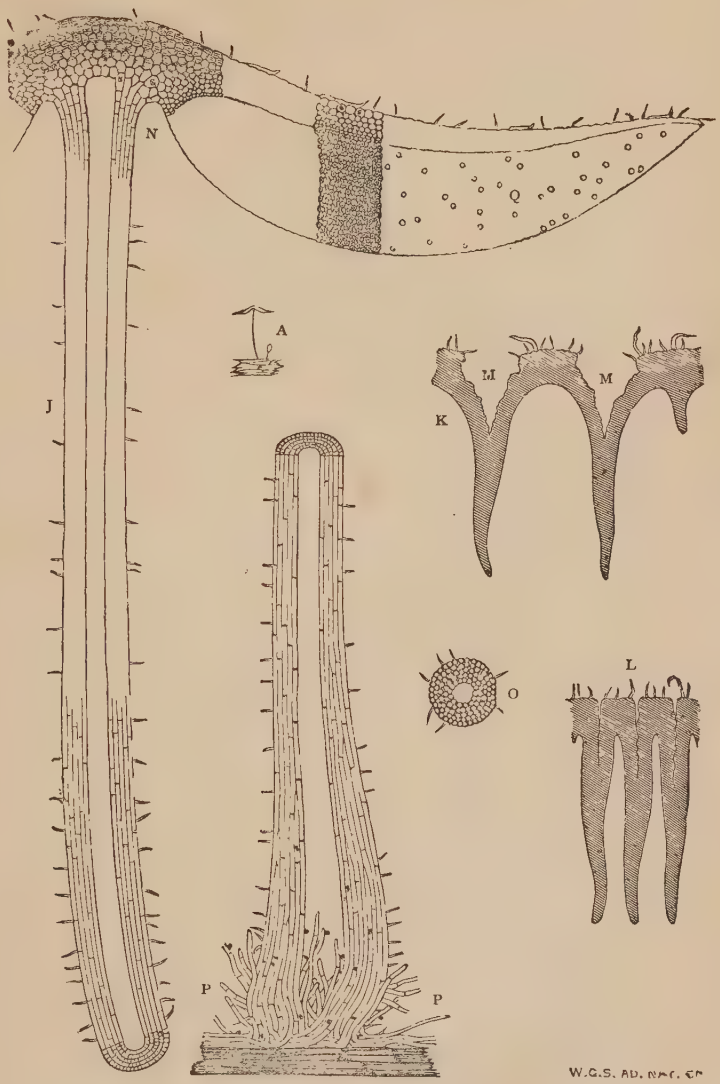
As a proof of how much there is still to be learnt respecting the life history of Agarics, I may say that in Sach's recently published *Text Book of Botany*, one of the very best and most complete books of its class ever published, there is no mention whatever made of cystidia in the description of Agaricus, and in La Maout and Decaisne's *Descriptive and Analytical Botany*, under fungi, it is stated that the male organs never produce antherozoids, and that the cystidia are always deprived of sterigmata or spicules.

To repeat and follow out these observations it is necessary to take the specimens for examination exactly at the proper period of growth, and to exercise the greatest care in securing an uniform moisture between the glasses. The life of the fungus is so short, and all the characters are so evanescent, that the points to be observed may be present one moment and all gone the next.

All the drawings have been made with a camera-lucida, and from different specimens, so where the dimensions of the parts slightly disagree, it is only such a disagreement (within defined limits) as is commonly found in Nature.

COPRINUS RADIATUS, FR.

A, *Natural size*; E, *Enlarged* 10 *diam.*; *Other Figures*, 20 *diam.*




COPRINUS RADIATUS, FR.

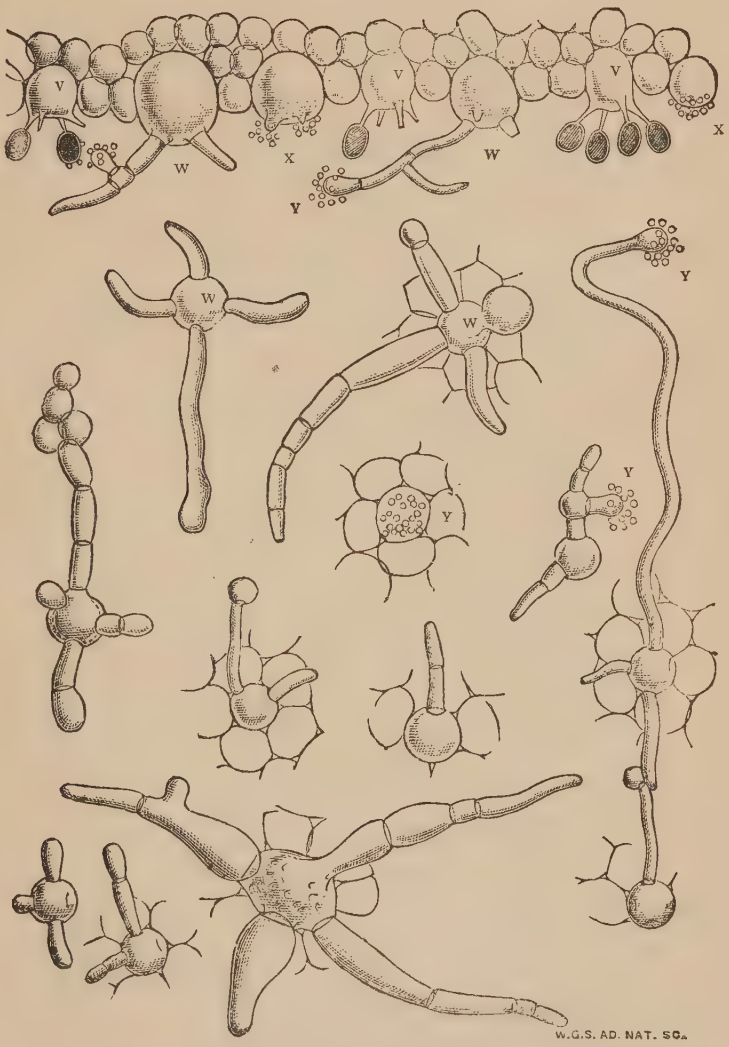
*Enlarged 50 diam.*

W.G.S. AD. NAT. 50.

COPRINUS RADIATUS, FR.

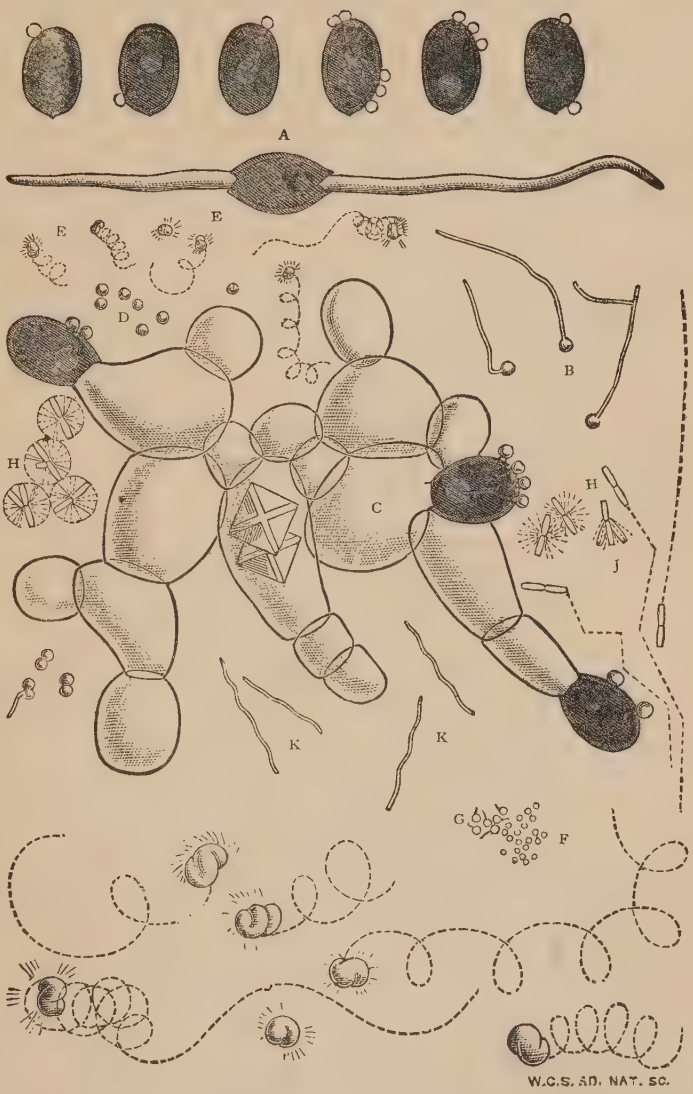
*Vertical Section and Surface of Gill enlarged* 50 *diam.*

V, *Basidia with spores*; W, *Cystidia.*



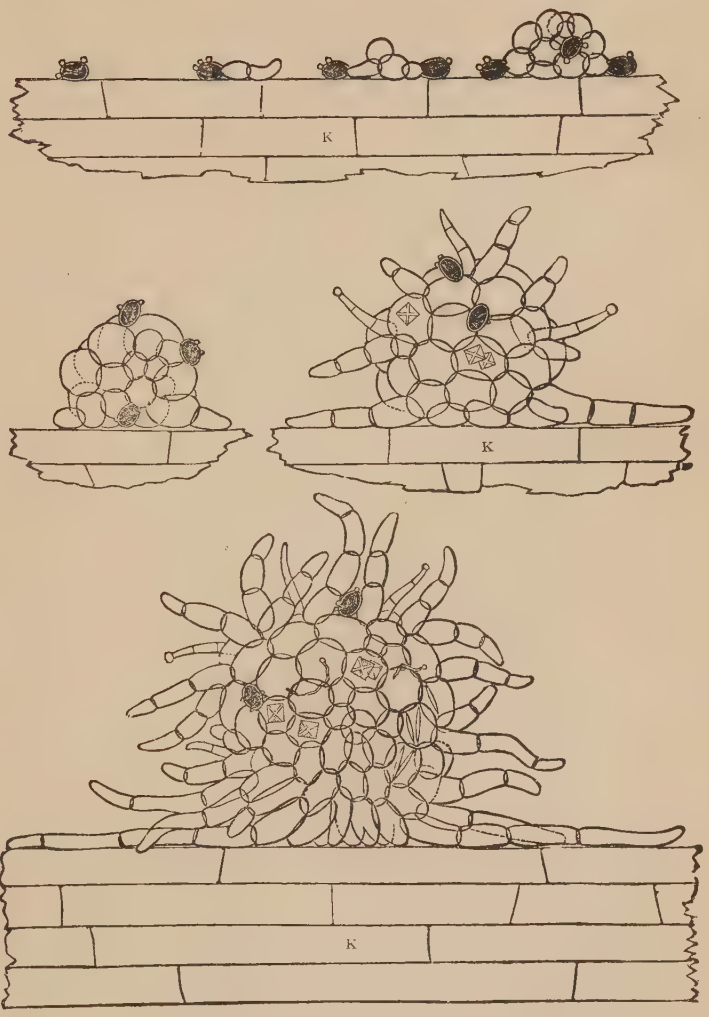

COPRINUS RADIATUS, FR.

V, *Basidia bearing Spores*; W, *Cystidia*; X, Y, *Spermatozoids.*



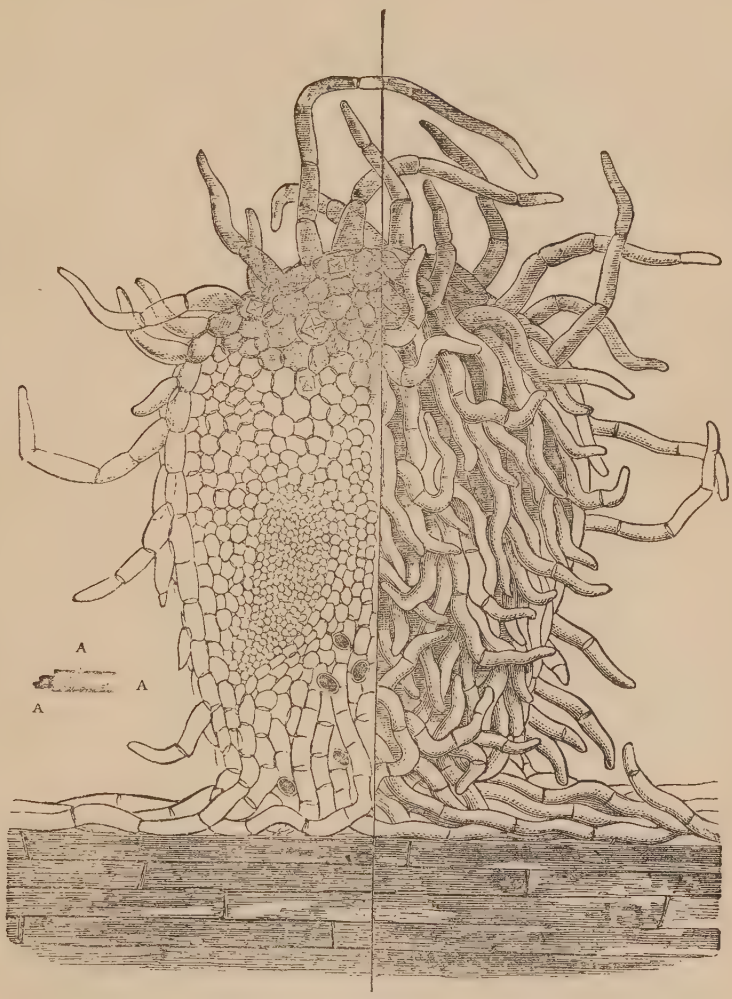

COPRINUS RADIATUS, FR.

*Spores, infant plant* c, *and infusoria, enlarged* 1000 *diam.; Spermatozoids at bottom further enlarged* 2000 *diam.*




COPRINUS RADIATUS, FR.

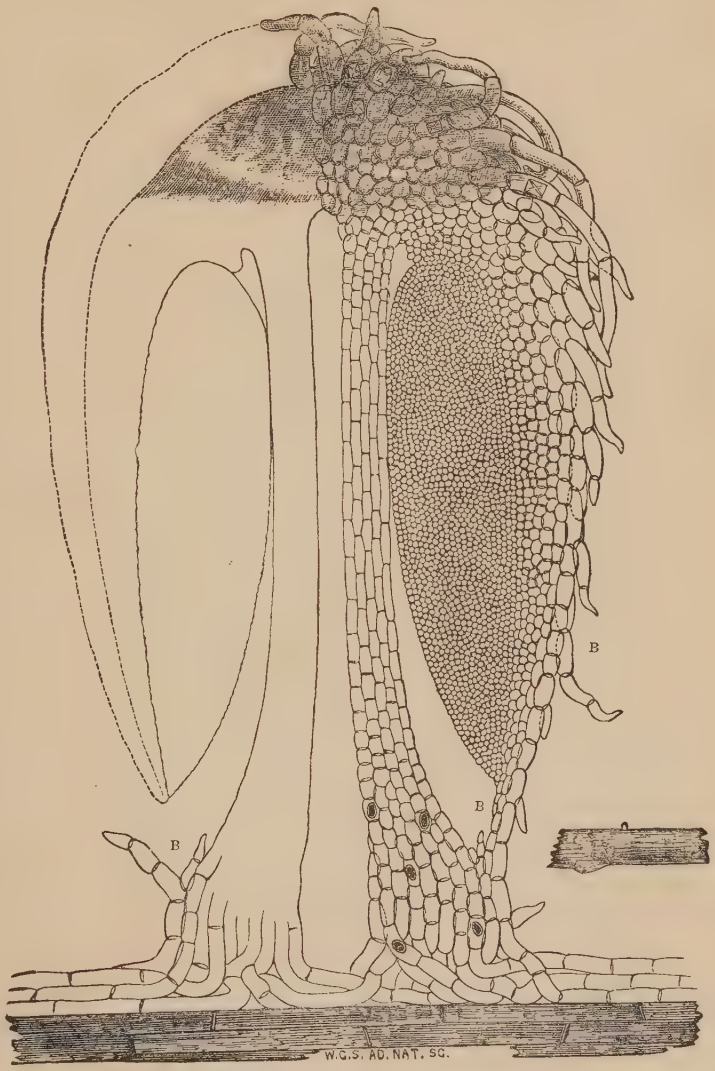
*Enlarged* 500 *diam., as grown from the Spores, in expressed juice of horse dung, under a covering glass of microscope.*




W.G.S. AD. NAT. SC.

COPRINUS RADIATUS, FR.

*Enlarged* 200 *diam., and natural size at* A, A, A.




COPRINUS RADIATUS, FR.

*Enlarged* 120 *diam.*

## III.—*The Resting Spores of the Potato Fungus.*

By Worthington G. Smith, F.L.S.

Plates CXIV., CXV., and CXVI.

The Potato disease in this country is rarely seen before the month of July, but this year I received some infected leaves for examination from the Editors of the 'Journal of Horticulture' at the beginning of June, and my reply to the correspondent was printed on June 10. The leaves were badly diseased, and I detected the Peronospora in very small quantities here and there, emerging from the breathing pores. This was a week or ten days before Mr. Berkeley brought the matter before the Scientific Committee of the Royal Horticultural Society;* and when I heard Mr. Berkeley's remarks about the Protomyces, I immediately accused myself of great carelessness in possibly overlooking it; but I was equally certain of the presence of the Peronospora in the specimens I examined.

On receiving authentic specimens of diseased plants from Mr. Barron of Chiswick, the brown spots on the Potato leaves at once reminded me of the figures of some species of Protomyces, and the dimensions agreed tolerably well with some described plants of that genus; but the spots, when seen under a high power, appeared very unlike any fungus, and they were very sparingly mixed with other bodies much smaller in diameter, and with a greater external resemblance to true fungus spores. These latter spore-like bodies were of two sizes—one transparent and of exactly the same size as the cells of the leaf (and therefore very easily overlooked), and the other darker, possibly reticulated, and smaller. A few mycelial threads might be seen winding amongst the cellular tissue, and these threads led me to the conclusion that the thickened and discoloured spots on the leaves were caused by the corrosive action of the mycelium, in the same way as Peach, Almond, Walnut, and other leaves are thickened, blistered, and discoloured by the spawn

* See *ante*, vol. i., 1875, p. 795.

of the Ascomyces, as illustrated at the last meeting of the Royal Horticultural Society.

My opinion, therefore, was soon formed that the "new" Potato disease (as it has been called) was no other than the old enemy in disguise, or, in other words, that it was the old *Peronospora infestans* in an unusual and excited condition. That climatic conditions had thrown the growth of this fungus forward and out of season was probable; but the idea that the pest would not at length attack all and every sort of Potato was to me most unreasonable, though the more tender sorts might be the first to suffer.

Suspecting the two-sized small bodies before mentioned to be of the nature of spores, and remembering my experiments during last autumn with ketchup, in which I observed that the spores of the common Mushroom might be boiled several times, and for lengthened periods, without their collapsing or bursting, I thought I would try to set free the presumed spores in the Potato leaves by macerating the foliage, stems, and tubers in cold water. This maceration was necessary because the tissue of the diseased leaves was so opaque and corroded, and the cell-walls were so thickened, that it was difficult to distinguish the threads and suspected spores from the cellular tissue. I did not treat the leaves with boiling water, because I wished to keep the threads and spores alive.

From day to day I kept the diseased leaves, stems, and tubers wet between pieces of very wet calico, in plates under glass, and I immediately noticed that the continued moisture greatly excited the growth of the mycelial threads; this to me was quite unexpected, as I had merely wished to set the spore-like bodies free. So rapid was now the growth of this mycelium that after a week had elapsed some decayed parts of the lamina of the leaf were traversed in every direction by the spawn. Thinking the close observation of this mycelium in the now thoroughly rotten and decomposed leaves might end in some addition to our knowledge of *Peronospora infestans*, to which fungus I had no doubt from the beginning that the threads belonged, I kept it under close observation, and in about ten days the mycelium produced a tolerably abundant crop, especially in the diseased tubers of the two-sized bodies I had previously seen and measured in the fresh leaves. The reason why these objects, which undoubtedly occur in and about the spots, are so extremely few in number in those positions is, I imagine, because they require a different set of conditions for their normal growth, and these conditions are found in abundant and continued moisture.

The larger of these bodies I am disposed to consider the "oogonium" of the Potato fungus, and the smaller bodies I look upon as the "antheridia" of the same fungus, which are often terminal in position. The filaments of the latter are commonly

septate, and sometimes more or less moniliform or necklace-like. Both oogonium and antheridium are very similar in nature and size to those described as belonging to *Peronospora alsinearum* and *P. umbelliferarum*, and this is another reason (beyond my seeing undoubted *P. infestans* on Potato leaves at the beginning of June) why I am disposed to look upon these bodies as the oogonium and antheridium of the Potato fungus.

The larger bodies are at first transparent, thin, pale brown, furnished with a thick dark outer wall, and filled with granules; at length a number (usually three) of vacuities or nuclei appear. The smaller bodies are darker in colour, and the external coat is apparently marked with a few reticulations, possibly owing to the collapse of the outer wall. I have observed the two bodies in contact in several instances. After fertilization has taken place, the outer coat of the oospore enlarges, and soon gets accidentally washed off in water. Both antheridium and oogonium are so slightly articulated to the threads on which they are borne that they are detached by the slightest touch, but with a little care it is not really difficult to see both bodies *in situ;* and my observations lead me to think that conjugation frequently takes place after both organs are quite free. The antheridia and oogonia are best seen in the wettest and most thoroughly decomposed portions of the tissue of the decomposing tuber, but they occur also in both the stem and leaf. I consider Mr. Alexander Dean's remark, as reported in the 'Gardeners' Chronicle' for June 19 last, p. 795, to have a distinct bearing on this point, where he says, "In all cases where the seed tubers were cut they were quite rotten."

Before I referred to De Bary's measurements of similar organs in other species of Peronospora I was disappointed with the results of my observations, and felt disposed to refer the bodies and threads in the Potato leaves to Saprolegnia, but a glance at the figures now published and the similar figures copied from De Bary to the same scale, will show that if the bodies observed by me are Saprolegnia-like, the oogonia and antheridia figured by De Bary show an exactly similar alliance. Still, as the Saprolegnieæ are at present defined, I am by no means inclined to describe the bodies observed by me as *really belonging to that tribe of plants.*

The Saprolegnieæ have the habit of moulds and the fructification of Algæ, and they live on organic matter, animal and vegetable, in a state of putrefaction in water. One of the best known of these plants is *Botrytis Bassiana*, the parasite which causes the disease of silkworms. Now the genus Botrytis amongst fungi is almost or quite the same with Peronospora, to which the Potato disease belongs; and I consider it a strong argument in favour of my Saprolegnia-like bodies being the oogonia and antheridia of the

Peronospora when such an authority as Mr. Berkeley * considers one of the Saprolegnieæ (Achlya) "may be an aquatic form of *Botrytis Bassiana*"—the silkworm disease.

The common fungus which attacks flies (so frequently seen on our window-panes in autumn), *Sporendonema muscæ*, Fr., is said to be a terrestrial condition of *Saprolegnia feraæ*, Kutz., which latter only grows in water; and if a fly infected with the fungus be submerged the growth of the Saprolegnia is the result. It would now seem to be somewhat the same with the Potato when diseased, in the fact that when submerged a second form of fruit is produced.

Between the two moulds, Botrytis and Peronospora, there is little or no difference; the characters of Corda, founded upon the continuous or septate filaments, cannot be relied upon, and even De Bary himself figures *P. infestans* with septate filaments, like a true Botrytis. The intimate connection, however, between the Saprolegnieæ and some moulds cannot be denied, as the instances above cited clearly show; and I am therefore disposed to think that the fungus which produces the Potato disease is aquatic in one stage of its existence, and in that stage the resting spores are formed.

Reference may here be made to the bodies found germinating in the intercellular passages of spent Potatoes by Dr. Montagne (Artotrogus), and referred by Mr. Berkeley to the Sepedoniei. Ever since Mr. Berkeley first saw these bodies he has had an unswerving faith in the probability of their being the secondary form of fruit of *Peronospora infestans*, but unfortunately, as far as I know, no one has ever found a specimen of Artotrogus since Montagne.

The question may therefore be naturally asked,—How does Artotrogus agree with the presumed resting spores here figured and described? And has Mr. Berkeley been right or wrong in clinging so tenaciously to his first idea? Fortunately for the investigation of the Potato disease (which can never be cured till it is understood), Mr. Berkeley has given in the 'Journal of the Royal Horticultural Society' the number of diameters his figures are magnified to, and I have here engraved those figures so as to correspond in scale with my own drawings, which latter are sketched with a camera lucida. It will be seen that they are the same with each other both in size and habit, with the exception of the processes on the mature spore of Artotrogus—which processes may possibly be mere mycelial threads, or due to the collapsing of the inflated epispore. The reason these resting spores have evaded previous search is that no one has thought of

* 'Micrographic Dictionary,' p. 6.

finding them amongst leaves which had been macerated for a long period in water. There is, however, nothing unreasonable in fruit being perfected in water or very damp places, as it is common in the Saprolegnieæ and amongst Algæ in general. To sum up, there are four reasons why the bodies here described belong to the old Potato disease:

1. Because they are found associated with the Peronospora and upon the Potato plant itself.
2. Because they agree in size and character with the known resting spores of other species of Peronospora.
3. Because some other moulds are aquatic in one stage of their existence.
4. Because they agree in size with Artotrogus.

Now that these drawings illustrative of the fungus which causes the Potato murrain are reproduced in the following Plates,* it may be as well to explain at once some of the terms used and the nature and habit of the bodies hereafter referred to, for such readers as may not be thoroughly acquainted with the life history of the destructive parasitic moulds to which the Potato fungus belongs. For that purpose reference must be made to Fig. 1, which shows (greatly enlarged) a transverse section through the leaf of a Potato plant; the two great bodies at A A represent two minute hairs on the leaf, and at B B are seen the individual cells of which the leaf is constructed. When these hairs and cells are compared with the fine thread at C, which represents a branch of the Potato fungus coming out of a breathing pore of the leaf, it will be seen how very minute the fungus is in comparison with the dimensions of the leaf. This fine thread is no other than a continuation of a thread of spawn or mycelium which lives inside and at the expense of the assimilated material of the leaf. When this thread emerges into the air, as here shown, it speedily ramifies in different directions, and bears fruit at the tips of the branches, as at D D; these fruits are termed simple-spores, or conidia, because from their smallness they are dust-like. It is quite possible they may be an early state of the vesicles which contain the zoospores as seen at E, F. However this may be, they are commonly arrested in growth when still small, and they germinate in an exactly similar manner with the zoospores themselves, and may be considered somewhat analogous with seeds. The Potato fungus has another method of reproducing itself in the "swarm-spores" shown at E, F. These are so called because, on the application of moisture (as supplied by dew or rain, or when applied artificially), the vesicles set free a swarm of from six to fifteen or sixteen other bodies known as "zoospores," so named because they are furnished with two lash-like tails, and are capable of moving

* Plates CXIV., CXV., and CXVI.

rapidly about like animalcules. This rapid movement usually lasts for about half an hour, and (like the dust-like conidia or "simple-spores" before mentioned) the swarm-spores generally enter the breathing pores of the leaf, and there germinate. So potent, however, is the contents of these bodies when set free, that it is capable of at once corroding, boring, and entering the epidermis of the leaf, or even the stem or tuber itself. These zoospores are best seen when within the vesicle F, where they arise from a differentiation of the contents, but when once set free (G) they are, from the extreme rapidity of their movements, very difficult to make out. In about half an hour they cease to move, their lash-like tails (cilia) disappear, and having burst at one end, a transparent tube is protruded, which is a similar mycelium in every respect with that produced by the simple-spore, and which grows, branches, and fruits in a precisely similar manner.

Now the great difficulty which has beset botanists for so many years has been to account for the winter life of the Potato fungus. Simple-spores and zoospores are lost in the production of the mycelium or spawn, and this latter fine thread-like material cannot of course survive the frosts and rains of winter, but must utterly perish with the perished leaves and haulm.

A study of other species of Peronospora allied to the one which produces the Potato disease, reveals the fact of a third mode of reproduction. Simple-spores and zoospores are termed asexual, because they are without sex, as distinguished from other bodies called oospores, which are produced by the contact of two sexual spore-like bodies, known as the antheridium, which is the male, and analogous with the anther, H, and the oogonium, the female, and analogous with the ovary of a flower, J. The oospores, not till now seen for certain in the Potato disease, are the true resting spores. Instead of being transparent and unenduring, as are the simple and zoospores, these bodies are at length dense in substance, black-brown in colour, and covered externally with reticulations or warts. They are produced from the mycelium, by the contact of the antheridium and oogonium in the substance of the decaying plant; they are washed into the earth, and there they rest till a certain set of conditions makes them germinate in the year following their production, just as a seed falls and rests in the autumn and starts again into life during the following spring.

The terms here used will be better understood if the following note is borne in mind: The oogonium is analogous with a pod, the oosphere within answers to the ovule, and the oospore (or resting spore) is the matured seed. The antheridium with its contents is analogous with the anther and its pollen.

In various other fungi nearly allied to the Potato fungus these resting spores have been seen, measured, and illustrated, but till

now the resting spore of the Potato fungus has eluded all search. The reason generally given and accepted for its absence is, that the Potato is not the plant on which the fungus luxuriates to the greatest extent, and that if we only knew the plant it most affects (probably some South American species of Solanum) we should then find plenty of resting spores easily enough, for it must not be forgotten that the Potato fungus is by no means confined to the Potato. It grows on various species of Solanum besides *Solanum tuberosum;* it is even not unfrequent on the woody Nightshade of our hedges, and it grows upon the Tomato and other Solanaceous plants, together with at least one plant which belongs to quite a different natural order. On these latter, however, it makes less headway than upon the Potato. As an instance in point the allied pest of the garden Lettuce may be mentioned — *Peronospora gangliformis* — first described by Mr. Berkeley. Here, if the resting spores of the parasite are wanted, they must not be sought for in the Lettuce itself, where they are only sparingly produced, but in a plant belonging to the same natural order also commonly afflicted with the same parasite, viz. the common Groundsel; the resting spores are said to be even more common in Sow-thistles than Lettuces.

Therefore, although it is probable we shall have yet to look to some other member of the natural order Solanaceæ to find the resting spores in any abundance, yet, as the resting spores of the Lettuce mould can by searching be found in the Lettuce itself, so the resting spores of the Potato fungus have without doubt been found this year in the Potato plant.

How this came about is now pretty generally known. Mr. Murray exhibited some specimens of Potato leaves badly diseased before the Scientific Committee of the Royal Horticultural Society. In the corroded spots of these leaves Mr. Berkeley's sharp eye detected dark-brown warted bodies (but no mycelium), which he referred to the genus Protomyces. Assuming these bodies to be the true resting spores, which they doubtlessly are, they were necessarily free, as the coat of cellulose disengages them from the mycelial threads. But some similarly spotted leaves had been previously sent on to me, from the 'Journal of Horticulture,' upon which I detected the old Potato fungus, mycelial threads within the leaves, and some circular transparent bodies of two sizes, new to me.

In attempting to wash the circular bodies out of the leaves and stems, by maceration in water, I found the moisture greatly accelerated the growth of the mycelium, and that the long-sought-for oogonium and antheridium was at length the result. These bodies were at first most sparingly produced, so that for many days, and after most careful searching, I could only find one or two. Afterwards I found them more abundantly in different stages of maturity,

especially in the very putrid stems and in the tubers when in the last stage of decomposition. Mr. Berkeley afterwards found them with abundant mycelium, after the meeting of the Royal Horticultural Society on July 7, where he exhibited a drawing of one resting spore still attached to its thread. Mr. Broome (from material sent by me) has also detected and sketched, together with the immature spherical bodies, one of these brown, coarsely-marked resting spores, but it was so involved in the mycelial threads (so he writes me) that he could not set it free. It is quite possible that the condition of the Potato, as seen during the present season, is quite exceptional, and that it may not occur again for a long series of years. Mr. Broome has written me to say he has never seen anything similar in diseased Potatoes.

In the accompanying illustration, which is an exact copy of the first sketch taken, the oogonia and antheridia are seen in the substance of the lamina of the leaf, the two bodies being in contact at H, J. In Fig. 5, Pl. CXV., many more of the same bodies are shown; some in actual contact; the two upper figures, K and L, show the resting spores some time after fertilization, when a coat of cellulose is the result. In K the spore is surrounded by this coat, whilst at L the spore is accidentally washed out by maceration in water. The semi-mature resting spores, as shown in these figures at M M, are furnished with a dark coat or skin; this coat, when further maturity is reached, clearly resolves itself into two layers, the inner one being termed the endospore, and the outer, which in *Peronospora infestans* is almost black in colour and warted, the exospore. The latter resembles in outward aspect, instead of one spore, a dense concreted mass of minute brown-black bodies. The antheridia are shown at N N. The perfected resting spores are slightly egg-shaped, and on an average are one-thousandth of an inch in diameter. The oosphere is fertilized by the contact of the antheridium; when the two bodies accidentally touch the latter fixes a small branch or tube, called a pollinodium or fecundating tube, into the wall of the oogonium, and discharges part of its contents into the protoplasm of the infant resting spore; when these resting spores are mature the mycelial threads soon vanish, and the spores are free.

When I read my first notes before the Royal Horticultural Society I had not been able to detect this fecundating tube, but since then I have several times seen it. After the Potato plant has been badly attacked and destroyed by the fungus, every part of the plant and its parasite perishes, except the dark-brown warted resting spores just described, and these find their way into the earth and hibernate. When they awake to renewed life in the summer they must germinate in the damp earth, and if no Potato plants are near they perish, as the earth cannot support them; in this

they are not unlike the seeds of germinating Dodder, for if they cannot find a proper host they die. But if Potato plants happen to be near the corrosive mycelium, it at once penetrates and enters the tuber or haulm. The tuber cannot produce simple or zoospores if buried, but in the haulms the mycelium doubtless soon grows and produces both these forms of fruit. These are at once carried by the air into the breathing pores, and the whole history of the fungus here described is re-enacted.

Since my observations on these bodies were published in the 'Gardeners' Chronicle' for July 10, I have (by the courtesy of the Rev. M. J. Berkeley) had an opportunity of carefully examining and measuring the original specimens of Dr. Montagne's Artotrogus, found long ago in the intercellular passages of spent Potatoes, and from the first considered to be the secondary form of fruit of the Peronospora by Mr. Berkeley. I have no hesitation whatever in saying that the bodies lately seen and now figured by me are positively the same with Dr. Montagne's in every respect, and when reflected and traced with the aid of a camera lucida no difference whatever can be detected. The bodies seen in Dr. Montagne's specimens are, without doubt, the fertilized and half-mature resting spores, and therefore dense, uncollapsed, and exactly the same in size, habit, and colour with mine when in the same stage of growth. After the lapse of so many years the threads, as might be expected, have more or less perished, but it is not difficult to find traces of antheridia in the specimens.

For comparison, the original figure of Artotrogus (Fig. 3) is here exactly reproduced to the same scale as my drawings, from vol. i. of the 'Journal of the Royal Horticultural Society,' to show the similar nature of the bodies illustrated. Since this was engraved Mr. Berkeley has kindly forwarded Dr. Montagne's original drawings to me for examination, and I may as well say they contain many more threads and oogonia than are shown in this cut, and they are also more like my organisms now brought forward. As for some of the bodies being shown as if within the threads by Dr. Montagne, I consider this of little moment, as the oogonia are at times almost or quite sessile, and consequently, when seen in some positions, they put on an appearance of being within the mycelium, whilst in reality they are upon or under it. As for the echinulate body at O, described as a "mature spore," it is not exactly like Dr. Montagne's original drawing, which is shown as furnished with a thick wall, and there are no "mature" spores in his specimens. After a most careful and searching examination of the latter I can find no such bodies, but there are several spores on the two mica slides which put on a *spuriously* echinulate appearance, which is owing to the collapse of the coat of cellulose, as suggested by me as a possibility when I read my first paper.

It will be observed there is a little difference in size between my oogonia (Fig. 5) and those copied from the 'Journal of the Royal Horticultural Society;' this is because the figures in the latter are somewhat incorrect. When the *actual specimens* are examined and measured side by side they are in every way identical.

Mr. Berkeley has also most obligingly sent me a specimen of another (new species?) of Artotrogus, found in decayed Turnip by Mr. Broome in 1849. Here the threads and semi-mature bodies are in the same style as the oogonia and threads from the Potato, and the mature spore is not truly echinulate; it is globular, with a slight tendency to an oval shape, and is covered with warts. It is probably the resting spore of *Peronospora parasitica*, the pest of the Cabbage.

In Figs. 4 and 2 are given copies of the oogonium and antheridium of *Peronospora umbelliferarum* and *P. alsinearum*, enlarged from De Bary to the same scale as the other figures, to show the close similarity in size and habit.

Since this subject has been made public Mr. Carruthers has kindly furnished me with a copy of Dr. Farlow's paper on the Potato Rot, extracted from the 'Bulletin of the Bussy Institution,' part iv., a paper I had not previously seen. As some of Dr. Farlow's practical observations seem to have a direct bearing on some of the points raised by me, I will conclude by extracting one or two sentences: "The disease is first recognized by brown spots on the leaves" (p. 320). "If we examine any Potato plant affected by the rot, even before any spots have appeared on the leaves, we shall always find these threads in the leaves, stem, and, in fact, nearly the whole plant" (p. 322). "The Peronospora is much more easily affected by moisture than the Potato plant itself." "Suppose the temperature to keep equally warm, and the atmosphere to become very damp, then the absorbing power of the mycelium is very much increased, while the assimilating power of the leaf-cells is little altered. Thus it happens that a sudden change from dry weather to moist will cause the mycelium to increase so very much beyond the power of the Potato plant to support it, that in the struggle for existence the latter blackens and dies." "When the disease has arrived at a certain point, viz. just about the time of the appearance of the spots on the leaves, these mycelial threads make their way into the air" (p. 323).

I give in conclusion an illustration of the perfectly mature resting spore of *Peronospora infestans*, as seen imbedded in the substance of the Potato leaf (Pl. CXVI.). These resting spores, which carry on the winter life of the fungus, are not restricted to the leaves, for I find them sparingly in both haulm and tuber, although I have at present seen the best specimens in the leaves. The engraving given

herewith (Fig. 6) shows a transverse section through a black spot of one of the leaves from Chiswick, and the resting spore is seen at A nestling in amongst the cells of the leaf. An antheridium, B, and two oogonia (C, C), from which such resting spores arise, may be seen in the cut, and the old common form of the fungus will be noticed breaking through a hair on the upper surface of the leaf, which is a very uncommon occurrence. The situation of the resting spores can generally be ascertained on the leaves by noticing the slightly thickened and very dark spots, for the bodies are commonly in these spots. It is, however, an extremely difficult matter either to get them out, or, indeed, to see them when imbedded, for, when mature, they are black-brown in colour, and only a little larger in size than the leaf-cells. These leaf-cells are also intense brown-black in colour from contact with the hurtful mycelium, and almost as hard as wood. The best way to see the resting spores is to macerate the leaves for several days in water, and then set them free by crushing the spot between two slips of glass. The presence of the fungus in the leaf makes the cells very thick and woody as well as black, so that in crushing the leaf-cells the resting spore is not uncommonly crushed at the same time. With care, however, they can be got at, when they will be seen, as at D, covered with warts or coarse reticulations, and beautifully regular and perfect in outline: when young they are of a pure warm sienna colour, and when perfectly mature, brown-black and shining. They are sphærical or slightly egg-shaped, and measure on an average about one-thousandth of an inch in diameter. I consider it worthy of special note that these resting spores are almost exactly the same in size, conformation and colour with *Peronospora arenariæ*, Berk., an allied species found parasitic on *Arenaria trinervis*. In looking for these bodies care must be taken not to confound them with corroded cells, granules of starch injured by the disease, or foreign bodies.

At E is shown a semi-mature resting spore with pollinodium attached, accidentally half washed out of its coating of cellulose by maceration in water.

I may say as an addendum that to me there is a marked analogy in size and habit on the one hand between the oogonia and the vesicles which contain the zoospores, and on the other hand between the simple-spores and the antheridia. I consider that the oogonia and antheridia are merely the intercellular condition of the vesicles which contain the zoospores and conidia, which latter are the aërial state of the former.

The facts which point in the direction just indicated are these: Sometimes there is no differentiation in the contents of the vesicles, but the plasma is discharged in one mass and not in the zoospore condition, the vesicle then resembles the oogonium. At

other times the oogonium shows a distinct differentiation in its contents, and matures from one to three resting spores, which to me shows an approach to the condition of the vesicle which usually gives birth to the zoospores.—See also the 'Gardeners' Chronicle,' July 17 and 24, from which the above Plates have been taken.

Since the above observations were printed, the following facts have been observed by me, and recorded in the 'Gardeners' Chronicle' for July 31.

1. Some plants sent to the Royal Horticultural Society by Mr. Dean on July 21 were covered with the Peronospora far beyond anything I had ever seen before. The haulm, the leaves (on both sides alike), and the berries, were covered. Some of these plants, after being placed on a garden bed, and covered with leaves (to keep them moist), were the next day one white mass with the Peronospora.

2. The Potato fungus (as commonly seen) bears a far larger number of simple-spores than inflated vesicles containing the zoospores or swarm-spores, but in Mr. Dean's plants the fungus produced zoospores almost exclusively, and in the greatest abundance. As the zoospore is a higher development of the plant than the simple-spore, this latter observation points to the unusually robust health of the fungus this season.

3. On suspending the infected leaves over a glass of water for from twelve to seventy-two hours, the swarm-spores fell in abundance (either free or in the vesicle) on to the water, and there germinated. No single drop of the water could be taken up for examination without meeting with the germinating spores, the threads radiating over the water in every direction, evidently in quite a congenial element. It brought the following fact to light, which is of importance—some of the vesicles which usually discharge the zoospores discharged instead a thick mass of mycelium; and this cord, when it had proceeded a considerable distance over the water, there had its contents differentiated in a necklace-like manner, and gave birth to the zoospores far removed from the original vesicles. The same thread also produced two true oogonia on the water.

4. At the meeting of the Scientific Committee of the Royal Horticultural Society, held on July 21, Mr. Renny showed a species of Saprolegnia which, he said, might be mistaken for Peronospora. But if reference is made to my original paper it will be seen from the first that I have perceived the intimate connection between the new condition of the Potato fungus and the Saprolegnieæ. On my side I have the high authority of Thuret and Berkeley for similar alternation in the diseases of silkworms, flies, &c. I am quite prepared, therefore, to consider Mr. Renny's plant,

if not the same, some close ally with mine, even if it should turn out to be a true Pythium, and its oogonia produce zoospores in water, especially after what is known of the nature of Cystopus, the close ally of Peronospora. Two strong points in favour of this view are these: (1) The resting spores of Pythium are *unknown*, but if I find Pythium inside Potato stems and leaves mixed up with the Peronospora, and the same Pythium in the very centre of the tuber of the Potato (as I have done), there maturing itself and forming its resting spore, then the identity of the two may reasonably be assumed, and the resting spore of the Pythium, as well as the Peronospora, is found. (2) The same cells in the Saprolegnieæ will alternately produce, under the same (or different) conditions, zoospores or resting spores; therefore, if zoospores are produced in Mr. Renny's oogonia in water, it is reasonable to assume that under different conditions resting spores would be formed by similar cells. I have, from the first, believed the Saprolegnia condition of the fungus to be widely diffused, and when in that state it quite possibly grows on diverse plants and substances in watery places, as was explained by me. The Saprolegnia is the caterpillar condition (belonging to the water, like the larva of the dragon-fly), the Peronospora somewhat analogous with the perfect butterfly, and the resting spore with the dormant chrysalis.

5. I find by experiment, when badly diseased haulm, fruit, and tuber are partly submerged for from one to four days, the Peronospora changes its character, and produces the Pythium or Saprolegnia-like growth on the submerged parts. On examination of the plants this may be easily overlooked, as the Saprolegnia commonly frees itself and floats on the surface of the water, and must be carefully taken off (invisible as it is) with a camel-hair pencil. If the oogonia now produce zoospores in the water, as in Pythium, which is possible and even probable, it in no way invalidates my views, or makes the connection less probable between Pythium and Peronospora.

6. The aërial spores of the Peronospora never become globular in water, whilst the oogonia and antheridia are always so.

7. A superabundance of water excites the growth of the mycelium, but it retards the proper production of the resting spore, just as a superabundance of water in most plants makes leaves and retards flowers.

8. In my calendar of the weather I find we had here only five wet days from May 7 to June 10 (no wet between May 8 and 20), and it was during this dry weather that the Potato fungus this year lived inside, and at the entire expense of the plant, and there perfected its resting spores. With the twenty-two wet days after June 10 the Peronospora put on its usual shape, and came to the surface.

9. I have got my most abundant materials from the tuber when soft and almost transparent, like painter's size; in this state the starch is utterly destroyed, and, what is most curious, there is no offensive smell. The tuber frequently decomposes with a horrible fœtor, and turns whitish inside; the starch is then present and more or less injured, and very little can be seen of the fungus.

10. The season is too far advanced, and the fungus has already caused too much destruction, to think of grappling with it this season, but when it is remembered how the Vine, the Corn, and Hollyhock parasites have been restrained, it certainly does not seem impossible that means may be found to mitigate the damage done every year by the Potato murrain.

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# THE TENDENCIES OF SYSTEMATIC BOTANY.

BY

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# THE TENDENCIES OF SYSTEMATIC BOTANY.

IN the commercial world it is considered a laudable proceeding on the part of any honest trader to pause once or twice in the year and review his position, take account of his stock, consider the transactions of the immediate past, and determine on future operations. The reckless adventurer may not deem any such process essential, but thereby he neither merits the confidence or esteem of those who are worthy to bestow it. So also is it incumbent on those who pursue science to pause, if not so frequently, at least occasionally, and reflect on the past, contemplate the present, and forecast the future, in so far as his own particular study is concerned. Whether he shall always keep silence as to his conclusions, or communicate them as a warning or encouragement to others, may be matter of opinion. There may be times when to be silent is little short of treachery, especially when there is ever so small a hope that by indicating rocks ahead the vessel may be directed into a safer channel.

The number of those who take an interest in the tendencies of any one branch of biological science is comparatively small, and probably those who interest themselves in botanical subjects are by no means so numerous as those interested in entomological or other sections of zoology. Still the few are entitled to regard, and to them the estimate which one of their number may feel it imperative to make of the tendencies exhibited by the systematists of the day may not be without interest or importance.

It may be premised that although the writer will draw his conclusions, and educe illustrations from his own special branch of the science, he does so in full confidence that the tendencies which he purposes to indicate are not peculiar to that branch, but are more or less present in all. The experiences of others having been canvassed and compared with his own, he believes that there are good grounds for the conclusion that not only amongst the lower, but also amongst the higher orders of plants, the same practices prevail, and the same tendencies are making

themselves felt. What is true of fungi is true also of Lichens and unicellular Algæ; it may be also of the higher Cryptogams; certainly the fears expressed by those most capable to judge of the aspects of Phanerogamic Botany point unmistakably to the same conclusions.

Every allowance must be made for the extended and universal use of the microscope, which has so much increased our knowledge of the minute structure of plants during the past quarter of a century. It may be that this continual resort to the microscope has given to minute structural differences an undue characteristic importance in some instances; but more than all, it has induced a method of closer observation; it has fostered the faculty of seeing, whilst at the same time it has dimmed the power of recognising broad and general affinities. Every minute hair and scale is depicted with fidelity, and every cell numbered, whilst the general contour is forgotten, and the broad effects of light and shade which pleased our forefathers is lost in the pre-Raffaelite adoration of the trivial and ornate.

Some ten or twelve years ago the makers of species ostentatiously ranged themselves on two opposing sides, so that "splitting" and "lumping" for a time became the watchwords of parties; but the controversy on what constitutes a species has subsided into comparative indifference, and theory has given way to practice, leaving on record hundreds of doubtful species for future generations of botanists to puzzle over and ultimately discard. So long as the fashion was in the ascendant for dividing one species into twenty, no very permanent injury was threatened to the future of botanical science. Labour was largely increased it is true, but the old generic distinctions remained, and the mischief was at least limited by recognised boundaries. Ultimately, however, a new direction for activity was discovered, and genera no longer received their old respect. The pent-up waters burst their bounds, and threatened a new deluge far more disastrous than its predecessor. This leads to a consideration of the primary tendency of the age, which commenced by elevating individuals to the rank of species, and now threatens the fate of Babel by the confusion of all generic distinctions.

Anyone who has observed closely the progress of systematic botany during the past few years cannot fail to have noticed the great and sudden increase in the number of genera, out of all proportion to new botanical areas. By a closer inspection it will become evident how this great accession has been accomplished. The old genus of Discomycetous Fungi accepted by Fries under the name of *Peziza* in his "Systema," published in 1822, was still recognised with very slight modifications by the same author in 1846, and at that time no one thought of proposing any alteration; indeed, some of the groups which he

then separated under new generic names did not meet with any general acceptation. When Professor De Notaris subsequently propounded a scheme for the rectification of the classification of the Discomycetes, it scarcely met with consideration. The spirit of the age had not yet set in in the direction of change. It would be scarcely necessary to allude to subsequent works, or just to charge upon any one or two individuals the questionable honour of splitting up the genus; especially when this one has been selected, not as an isolated instance, but as a type of many others. Without attempting to enumerate the genera which have been proposed to occupy the place formerly held by *Peziza*, one work may be taken as a type of others: it is the Flora of a Duchy of Germany, and in this the species of *Peziza* are distributed over no less than thirty-six genera, for thirty-five of which the interests of science made no demand whatever. It may unhesitatingly be pronounced that the whole of these thirty-five genera are based upon insufficient characters, and that their only merit is to exercise the memory and introduce unnecessary confusion. Another objection might be urged against them, that they are not constructed on any one principle. Here two or three genera are based on the presence or absence of a stem, there on the globose sporidia. In one instance the characteristic feature of the genus is the presence of a sclerotioid base to the stem, in another the thick sulcate stem, and in another the urceolate form of the cup. If such features are to be considered as sufficient, then nearly every species might be regarded as the type of a new genus. Surely if it is sound to construct a genus for stipitate species with globose sporidia, it must be equally sound to construct another for sessile species with globose sporidia, another for stipitate species with elliptical sporidia, another for sessile species with elliptical sporidia, and thus through the whole range of the forms of sporidia. Such a method, however unnecessary it might be, and liable to other objections, would still be consistent. In the case of other genera, such as *Sphæria*, the main features of the new genera are the form, colour, and septation of the sporidia, so that at least the method has more of uniformity.

It would be almost universally admitted that the genus *Peziza*, as limited by Fries, was one of the most natural in the whole range of fungi. It may be cited as evidence of this that students and persons little acquainted with fungi seldom erred in referring each species to the proper genus. The main features of a fleshy cup with a smooth disc commended itself at once; and although there might be a thousand species, the whole arrangement was characterised by simplicity, and fulfilled all the requirements of classification; surely nothing more was requisite. It is quite immaterial whether a genus contains one species or

one thousand; it should no more be contended that because a genus is a large one it must be cut up into a number of smaller ones, for the sake of convenience, than to determine that no genus shall consist of more or less than twenty species. Numbers are wholly beside the question, and *convenience* is not science. In this instance we think that the inference is sound that one of the tendencies of the systematic botany of the day is the unnecessary multiplication of genera.

It may be urged that the evidence adduced of the reduction of one large genus does not warrant this conclusion. Perhaps it would not, if this were an isolated instance, but it is only one of too many. Without passing from the asci-bearing fungi we have in the genus *Dothidea* another analogous instance. The same flora, as cited above, contains eight genera in place of the one constituted by Fries. This is hardly the place to discuss the merits of the different genera proposed in the place of one which also was a very natural one and required no modification. To constitute a genus like *Homostegia* on the basis of the habitat of the species is so unsound that it only needs applying the same principle throughout the genus to convince any unprejudiced reader of its absurdity. If one habitat is to be accepted as the characteristic of one genus, why not another? Manifestly these are only, at the most, sectional or specific differences; or if generic in one case, why not in another? If generic, then species of *Dothidea* found on grasses, on leaves, on ferns, on twigs, on herbaceous plants, &c., have each as good a claim to be regarded as distinct genera as *Homostegia*.

Should this be considered insufficient, attention might be directed to the genus *Sphæria*, according to Fries, and the modifications proposed by more recent authors. Again, taking the same flora as our guide—which by-the-bye is by no means an extreme one, and does not include many proposed new genera—we find that forty-eight genera represent the old genus *Sphæria*, or rather as limited by Fries in 1846. Here again the limits of the primary genus were clearly defined, and the new genera have not been constructed for the reception of anomalous forms, but entirely by the breaking up of the parent genus. Botanists will comprehend at once the toleration with which we would accept the constitution of a new genus in which to place one or two anomalous species, which differed in some permanent, though it might be rather unimportant feature, from the genus to which it had been affiliated. But there is not even this excuse for the majority of genera into which the species of *Sphæria* have been unceremoniously transferred. A little excuse may be made for the removal of species with a membranaceous perithecium from companionship with those in which the perithecium is more or less carbonaceous; but

on the whole the multiplication of genera was uncalled-for and unnecessary, and the new genera are constructed on unsound principles.

All the genera in this group (*Ascomycetes*), before the irruption of the Goths and Vandals, were constructed on the principle that generic characters should be based fundamentally on the vegetative system, leaving the reproductive for specific distinction; that is, differences in the size, form, colour, and septation of sporidia, had a primary importance in the discrimination of species, but had no generic value. The character of the receptacle which contained this fructification had the chief place in the generic diagnosis. It was possible under such a method at once to refer an immature or an effete specimen to its genus, though not to its proper species. The new genera are mainly constructed on the basis of the reproductive system, and consequently the mature fruit must be known before the proper genus can be determined. It is well known that in species of *Sphæria* which have ultimately sporidia with five septa, these sporidia are at first simple; they then in process of development become uniseptate, afterwards triseptate, and finally five-septate. There are thus three of the supposed new genera through which the same species passes before it arrives at its final determination. A specimen found to-day with simple spores may be determined as belonging to one genus; a week hence it may be found again with uniseptate sporidia, and is then referred to a second genus; a week or two later, and it is met with having triseptate sporidia, and is referred to a third genus; and finally it may be found with five septa to the sporidia, and receives still another generic name. This is manifestly playing at science. There is often no internal evidence whatever at the different stages that septation will proceed further; and it is only by finding sporidia and asci in different stages of development, in the same peridium with the triseptate or quinque-septate sporidia, that the life-history of the plant is learnt with certainty. There is another reason why this basis of classification is unsound, and that is the very different character of the vegetative system, the external habit and appearance of different species of *Sphæria* with very similar fruit, not to mention a certain amount of variability in the sporidia themselves. Even in the case of coloured sporidia, which is often made a chief generic feature, it is well known that some species are very long in acquiring their brown colour, and may be found ten times with colourless sporidia to once with coloured sporidia. Into what difficulty must the student be plunged when, instead of finding his *Sphæria* with hyaline sporidia, in a genus so characterised, to be informed that he must seek it in one devoted to species with coloured sporidia!

It cannot be an answer to this argument that the sporidia are imperfect when they do not bear the evidence of imperfection, and it is only from experience that the ultimate character of the sporidia can be known. In the face of this fact it is manifestly unsound to base classification on features which require first of all that it should be determined what is the life-history of the plant, and whether it has arrived at the final stage of its development, before its genus can be fixed. From this as well as previous illustrations it may be urged that, not only is there a tendency in the systematic botany of the day unnecessarily to multiply genera, but also to construct them upon unsound principles.

References might be made to other orders—as, for instance, of such genera as *Uromyces*, *Capitularia*, and *Puccinella*—all which are so identical that no sane mycologist would think of separating them from *Uromyces*, unless it might be by way of excuse for attaching his own name after them, and calling them new species. The most recent systematic arrangement of the *Myxogastres* also demonstrates with what extraordinary facility a batch of new genera can be extemporised from old materials.

It would be difficult to estimate with any certainty the number of recognized genera in fungi. The second edition of Lindley's "Vegetable Kingdom" enumerated 544; these were increased to 813 in the third edition (1853), and in the intermediate twenty-two years the increase may be fairly estimated as bringing the total number to not less than 1,000, exclusive of a great many that are acknowledged to be spurious or synonymous. The same or even greater difficulty exists in the determination of the number of species. Fries, in his "Epicrisis" (second edition), gives characters of 2,778 species of *Hymenomycetes* found in Europe. Hence it may fairly be concluded that the total number of species of *Hymenomycetes* is not less than 5,000, leaving a less number for the rest of the world, inclusive of North America, which is very rich, and the large number of *Polyporei*, &c., found in tropical countries. The number of good species of the *Discomycetes* which we have recently had occasion to study closely and critically is not less than 2,200, and the residue of the *Ascomycetes* will not be less than double that number. Consequently we think that it is a very safe estimate to place the number of species of fungi at 20,000. With such a number of plants it may readily be imagined with what concern those who are intimately attached to their study regard innovations which are calculated, not only to increase their labour to an alarming extent, but threatens to bring the whole of that branch of the science into inextricable confusion. The same fear is beginning to take possession of Lichenologists, and those who have devoted themselves specially

to the *Diatomaceæ* have been heard to intimate their dissatisfaction at the tendencies of the age. If we had not found an echo to our fears in those who have to deal with flowering plants, we had not ventured to attribute the tendency exhibited in relation to fungi to the whole area of systematic botany.

Some mycologists have still sufficient faith in the soundness of the principles on which the Friesian genera (for so they may be called) were constructed, that they are content to adhere to them in practice, and will only accept a very few of the new genera. On the other hand, if some recent floras are to be taken as evidence, certain mycologists seem resolved to adopt as many as possible of the new genera, excluding the old ones; so that two concurrent systems may be said to be coming into vogue—a double series of names, an unending catalogue of synonyms—leaving to a future generation the Herculean labour of discovering the good grain amongst so great an abundance of chaff. It is almost impossible for any person to keep pace with the rapid evolution of genera and species, to read and endeavour to comprehend them, much less store them in their memory, to note the conflicting interpretations of the same genus, to see two or three species accepted by one, rejected by another, or divided by a third; so that one feels constrained to add still another conclusion—that the tendency of the systematic botany of the day is rapidly towards chaos and inextricable confusion.

The free *emendation* of the characters of long established genera is another fertile source of mischief. The practice is by far too common so to alter and *emend* (?) an old genus as to limit considerably the number of species it can include; and this consequently lends excuse for the subsequent proposal of new genera to contain the species excluded from the old one by this process of manipulation. This leads to confusion as to the interpretation which is to be attached to the generic name, whether it is to be accepted as proposed by its author, or the more limited sense attached thereto by the emendator.

In a like manner the method of dealing with the parasitic Coniomycetous fungi may be alluded to. This method is probably confined absolutely to fungi, and has nothing analogous in other branches of botanic science. It has long been suspected—we cannot say demonstrated—that some of the species of *Puccinia* have relations of a peculiar nature with certain species of *Æcidium*, which are, according to this theory, but another form of development. However strong the conviction may be in some minds that this is really the case, it is surely premature to act as though the relations were satisfactorily proven, and *emend* the nomenclature accordingly. This course, though unsound and reprehensible, has been adopted, and advantage has been taken, by these radical reformers, of a change in the diagnosis

of the genus *Puccinia*, by unison of *Æcidium* as an hymeniferous stage, to replace the names of the venerable authors of the original species by their own; and Persoon, De Candolle and others, have been thrust aside to make room for the Schmidts and Schneiders of the new age. It has even been deemed a sufficient warrant for superseding the name of the original author attached to a species of *Puccinia*, to cite, or suppose some special form of *Trichobasis* as its uredo-form. By this means one large or variable species has afforded material for a dozen or twenty. It is most probable that each species of *Puccinia* has its uredo-form, although it is very doubtful whether they have been accurately assigned in all instances when the attempt has been made, often upon the slightest semblance of evidence. It is doubtful whether, in cases where mycologists have given new names to supposed species of *Puccinia* on the assumption that they have found the hymeniferous state in some *Æcidium*, or the uredo-form in some *Trichobasis*—wholly ignoring specific names previously applied to the bicellular, or most perfect condition, by old authors—should not find their new names discarded, and the old names revived, even if their suppositions prove true. To some persons the method resorted to by certain species-makers of discarding recognised names seems like "sharp practice;" it may be that harsher terms are applied to those who have effaced older and worthier names on an excuse so paltry, and which must fail to secure them the esteem of thoughtful workers in a future generation, when the fashion of the day has passed away.

It is scarcely necessary to refer at length to the acknowledged tendency towards increasing inordinately the number of supposed species. To secure uniformity of recognition of the limits of species is a hopeless task; nevertheless, sometimes the most credulous are subject to severe trials of faith. It is a relief to contemplate the terse and compact manner in which all the characteristic features of a species are compressed within the limits of two or three lines by some of the older botanists, as compared with the prolix thirty or forty lines in which attempts are made to characterise some new species, which the author himself scarcely seems to believe in. Constant care is necessary, not only against following example but too widely extended, but to guard against mistaking the variability of individuals for specific differences. The broader and more extended experience becomes, the larger the number of the same undoubted species and its allies which the botanist is privileged to examine from remote habitats or distant parts of the world, the less disposed is he to construct species hastily; and hence we find that the most irrepressible makers of new species are usually those whose experiences are confined within narrow limits. Exceptional cases may be found in those who are called upon to describe the flora of a new country.

There is perhaps another tendency, which exhibits itself stronger in the present day than at any previous period, which may be alluded to in passing; and that is the practice of applying complimentary specific names. It is always preferable that a specific name should, if possible, indicate the principal feature, or one of the principal features, which distinguish the new species from its congeners. In a large genus this is not always possible; but it is to be feared that such a desirability never presents itself very strongly to the mind of those who are continually complimenting their friends, or flattering their patrons, by attaching their names to some obscure plant. It is amusing to note in most cases how speedily Professor Jones returns the compliment which Doctor Smith has paid him, and how promptly the *Sphæria Smithii* of Jones follows the *Sphæria Jonesii* of Smith. Less exception can be taken to the dedication of a new species to the memory of a deceased botanist who may have made that genus a special study; but mutual interchange of such compliments between living men, who should have greater respect for their science than to make it subservient to flattery, is no great compliment to their own judgment. Instances could be cited in which officers of state, nobles, and honourables, have been called upon to accept the dedication of a new species to their name. What a satire these men must think such exhibitions to be on the science which thus professes to honour them. It is somewhat anomalous that some of the most objectionable forms of this tendency are exhibited by citizens of the first Republic of the world. Their wives and female acquaintances, upon a little quiet reflection, could hardly thank them for sending their names down to posterity spiritually wedded to some blight, mildew, or other destructive fungus. Taste probably differs on either side the Atlantic.

We have freely commented on such of the tendencies of the age in regard to systematic botany as have most forcibly impressed themselves on our minds; and whilst we have done so, it has not been hinted that we regard British botanists as sinners before all others. On this point we desire that no misapprehensions should exist. The "silver streak," or some good fortune, has as yet spared us from the epidemic which seems to prevail so extensively on the Continent. As far as our own experience goes, it is with no little pleasure that we exonerate the systematic botanists of these islands from participation in the follies, and worse than follies, to which we have thought it expedient to direct attention. It is earnestly to be hoped that in these matters they will not import their fashions from abroad.

It is scarcely expected of us to speculate on the sources of

these tendencies, but they do in some sort seem to be related to the temper of the times in other matters. There is a lacking of respect, almost a defiance of authority, an impatience of restraint, a desire for change, a restlessness and dissatisfaction at old barriers and landmarks, an assertion of individual right to think and act independently of every one and every thing else—all the tendencies which manifest themselves in times of political activity—and which expend themselves in various directions when the political activity subsides. It can hardly be expected that science alone should escape the influence of events that stir nations to their last man; and though the relation of cause to effect may be difficult to trace, there may at least be good ground for speculation.

For the future, we would still hope that some seasonable check will intervene to prevent the consummation of the designs of those who would completely overthrow all the labours of those who have toiled in this branch of science. We have faith in the few who have not bent the knee to Baal making their protests heard, and that time and reflection will also aid in convincing those who are now foremost in destruction that their work is not progressive but retrogressive, and that it is better to build than to destroy.

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# LIST OF FUNGI

FOUND IN THE

## NEIGHBOURHOOD OF WARWICK,

BETWEEN

## OCTOBER, 1871, & OCTOBER, 1872,

BY


## CECIL H. S. PERCEVAL, Esq.


---

### AGARICINI.

#### Agaricus.

##### Leucospori.

| | | | |
|---|---|---|---|
| A. | (Amanita) phalloides | | September. |
| | ,, rubescens | | August. |
| ,, | (Lepiota) rachodes | Castle Grounds, | ,, |
| | ,, granulosa | | October. |
| ,, | (Armillaria) melleus | | September. |
| ,, | (Tricholoma) gambosus | | April. |
| ,, | (Clitocybe) laccatus | | August. |
| ,, | (Pleurotus) subpalmatus | | September. |
| | ,, salignus | Castle Park Timber Yard | October. |
| ,, | (Collybia) radicatus | | August. |
| | ,, fusipes | | ,, |
| | ,, velutipes | | January |
| | ,, tenacellus | Castle grounds, | March. |
| ,, | (Mycena) alcalinus | | January. |
| | ,, galericulatus | | October. |

##### Hyporhodii.

| | | | |
|---|---|---|---|
| ,, | (Pluteus) chrysophæus | Castle Timber Yard | September. |
| | ,, eximius | ,, Grounds | October. |
| ,, | (Entoloma) sinuatus | Wedgnock Park | September. |

DERMINI.

| | | | |
|---|---|---|---|
| „ | (Pholiota) præcox | | February. |
| | „ spectabilis | | October. |
| „ | (Hebeloma) obscurus | Lodge Wood | September. |
| | „ rimosus | | „ |
| | „ geophyllus | | „ |
| „ | (Crepidotus) mollis | | August. |
| „ | (Naucoria) semiorbicularis | | January. |

PRATELLÆ.

| | | | |
|---|---|---|---|
| „ | (Psalliota) campestris | | |

~~STROPHARIÆ~~.

| | | | |
|---|---|---|---|
| „ | (Stropharia) melaspermus | Heathcote Farm | October. |
| „ | (Hypholoma) sublateritius | | April. |
| | „ fascicularis | | September. |
| | „ velutinus | | August. |
| „ | (Psilocybe) areolatus | Stoneleigh | September. |
| | „ semilanceolatus | | „ |

COPRINARII.

| | | | |
|---|---|---|---|
| „ | (Pancœolus) separatus | | September. |
| „ | (Psathyrella) gracilis | | April. |

COPRINUS.

| | | | |
|---|---|---|---|
| Coprinus | comatus | | September. |
| „ | micaceus | | February. |
| „ | deliquescens | | „ |

CORTINARIUS.

| | | | |
|---|---|---|---|
| C. | (Phlegmacium) purpurascens | | October. |
| „ | (Dermocybe) anomalus | | September. |
| „ | (Telamonia) ileopodius | | „ |

HYGROPHORUS.

| | | | |
|---|---|---|---|
| Hygrophorus | pratensis | | September. |
| „ | conicus | | „ |
| „ | virgineus | | October. |
| ~~Hygrophorus~~ | psittacinus | | October. |
| „ | calyptræformis | Castle Park | September. |
| „ | coccineus | | September. |
| „ | hypothejus | | October. |
| „ | olivaceo-albus | | September. |

GOMPHIDIUS.

| | | | |
|---|---|---|---|
| Gomphidius | stillatus | Wedgnock Park | September. |

### Lactarius.

| | | | |
|---|---|---|---|
| Lactarius | plumbeus | Stoneleigh | September. |
| ,, | pallidus | Lodge Wood | ,, |
| ,, | quietus | ,, | ,, |
| ,, | serifluus | | ,, |
| ,, | rufus | | ,, |
| ,, | fuliginosus | | ,, |
| ,, | mitissimus | | ,, |
| ,, | cyathula | Wedgnock Park | October. |
| ,, | subdulcis | | September. |

### Russula.

| | | | |
|---|---|---|---|
| Russula | nigricans | | August. |
| ,, | vesca | | ,, |
| ,, | heterophylla | | ,, |
| ,, | fœtens | | ,, |
| ,, | alutacea | | September. |
| ,, | rosacea | Wedgnock Park | ,, |
| ,, | emetica | ,, | October. |

### Cantharellus.

| | | | |
|---|---|---|---|
| Cantharellus | cibarius | | September. |

### Marasmius.

| | | | |
|---|---|---|---|
| Marasmius | urens | | |
| ,, | oreades | | August. |
| ,, | erythropus | | September. |
| ,, | rotula | | August. |

### Panus.

| | | | |
|---|---|---|---|
| Panus | stypticus | | January. |

### Lenzites.

| | | | |
|---|---|---|---|
| Lenzites | flaccida | | March. |

## POLYPOREI.

### Boletus.

| | | | |
|---|---|---|---|
| Boletus | flavus | | August. |
| ,, | laricinus | | September. |
| ,, | chrysenteron | | ,, |
| ,, | subtomentosus | Lodge Wood | ,, |
| ,, | pachypus | Found by Mrs. Russell, near Kenilworth | ,, |
| ,, | scaber | | ,, |
| ,, | castaneus | Lodge Wood | ,, |

### Polyporus.

| | | |
|---|---|---|
| Polyporus squamosus | | March. |
| „ intybaceus | Near Tachbrook | September. |
| „ giganteus | Lodge Wood | August. |
| „ nidulans | Castle Grounds | April. |
| „ fumosus | | February. |
| „ adustus | | April. |
| „ hispidus | | July. |
| „ dryadeus | | September. |
| „ ulmarius | | August. |
| „ fraxineus | | March. |
| „ annosus | | „ |
| „ versicolor | | February. |
| „ ferruginosus | | August. |
| „ vaporarius | | April. |
| „ ribis | | September. |

### Dœdalea.

| | | |
|---|---|---|
| Dœdalea quercina | | April. |

### Merulius.

| | | |
|---|---|---|
| Merulius corium | | February. |

### Fistulina.

| | | |
|---|---|---|
| Fistulinahepatica | | July. |

## AURICULARINI.

### Craterellus.

| | | |
|---|---|---|
| Craterellus cornucopioides | Stoneleigh | September. |

### Thelephora.

| | | |
|---|---|---|
| Thelephora puteana | | September. |

### Stereum.

| | | |
|---|---|---|
| Stereum hirsutum | | January. |
| „ sanguinolentum | | April. |
| „ rugosum | | „ |

### Hymenochæte.

| | | |
|---|---|---|
| Hymenochæte rubiginosa | | September. |
| Auricularia mesenterica | | February. |

### Corticium.

| | | |
|---|---|---|
| Corticium evolvens | Castle Timber Yard | March. |
| „ cœruleum | | „ |
| „ nudum | | April. |

## CLAVARIEI.

### Clavaria.

| | | |
|---|---|---|
| Clavaria cristata | | August. |
| „ Kunzei | Lodge Wood | „ |
| „ vermiculata | | September. |

## TREMELLINI.

### Tremella.

| | | |
|---|---|---|
| Tremella mesenterica | | March. |
| „ albida | | April. |

### Hirneola.

| | | |
|---|---|---|
| Hirneola auricula-Judæ | | September. |

### Dacrymyces.

| | | |
|---|---|---|
| Dacrymyces stillatus | | February. |

## TRICHOGASTRES.

### Geaster.

| | | |
|---|---|---|
| Geaster rufescens | Heathcote Farm | October. |

### Lycoperdon.

| | | |
|---|---|---|
| Lycoperdon pyriforme | | February. |

### Scleroderma.

| | | |
|---|---|---|
| Scleroderma vulgare | | August. |

## MYXOGASTRES.

### Lycogala.

| | | |
|---|---|---|
| Lycogala epidendrum | | April. |

### Reticularia.

| | | |
|---|---|---|
| Reticularia umbrina | | September. |

### Didymium.

| | | |
|---|---|---|
| Didymium physarioides | Castle Timber Yard | February. |

### Stemonitis.

| | | |
|---|---|---|
| Stemonitis fusca | Castle Timber Yard | February |

## NIDULARIACEI.

### Crucibulum.

| | | |
|---|---|---|
| Crucibulum vulgare | | |

## ELVELLACEI

### Morchella.

| | | |
|---|---|---|
| Morchella esculenta | | March. |

### Peziza.

| | | |
|---|---|---|
| Peziza venosa | | March, |
| „ cochleata | Lodge Wood | September. |
| „ vesiculosa | | April. |
| „ micropus | Castle Timber Yard | March. |
| „ aurantia | | October. |
| „ rutilans | | September. |

### Helotium.

| | | |
|---|---|---|
| Helotium pallescens | | October. |

### Bulgaria.

| | | |
|---|---|---|
| Bulgaria inquinans | | January. |
| „ sarcoides | | September. |

## SPHŒRIACEI.

### Xylaria.

| | | |
|---|---|---|
| Xylaria polymorpha | | September. |
| „ hypoxylon | | |

### Ustulina.

| | | |
|---|---|---|
| Ustulina vulgaris | | April. |

PERRY, PRINTER, WARWICK.

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Upper Holloway

London

N

BRISTOL
25
APR
1878

134

The fourth Fasciculus of Mr. Berkeley's Fungi will appear in December. The species included in it are as follows:—

Thelephora caryophyllæa, *P.*
——— laciniata, *P.*
——— cristata, *Fr.*
——— anthocephala, *Fr.*
——— mollissima, *P.*
——— lævis, *P.*
——— rubiginosa, *Schrad.*
——— tabacina, *Fr.*
——— corrugata, *Fr.* var.
——— lactea, *Fr.*
——— miniata, *Berk.*
Sphæria rubella, *P.*

Helvella crispa, *Fr.*
——— lacunosa, *Afz.*
——— elastica, *Bull.*
Sphæria herbarum, *P.* minor.
——— Bombarda, *Batsch.*
Erysiphe communis, *Schlecht.* *m.* Carduacearum.
Acrospermum compressum, *Tode.*
Peziza rhabarbarina, *Berk.*
Aspergillus aurantiacus, *Berk.*
Bulgaria sarcoides, *Fr.*
Peziza versiformis, *P.*
Geaster rufescens, *P.* minor.
Sclerotium Cepæ, *Lib.*
Sphæria corniformis, *Fr.*
Mitrula paludosa, *Fr.*
Elaphomyces granulatus, *Fr.*
Cantharellus sinuosus, *Fr. b.*
Peziza æruginosa, *Fr.*
Dothidea pyrenophora, *Fr.*
Sphæria Racodium, *P.*
Hymenogaster citrinus, *Vitt.*
Melanogaster Broomeianus, *Berk.*
Peziza fusca, *Fr.*
Perisporium princeps, *Berk.*
Sphæria complanata, *Tode,* minor. (non diversa a num. 267.)
Phacidium Patella, *Fr.*
Sphæria Doliolum, *P.*
Næmatelia encephala, *Fr.*
Perichæna strobilina, *Fr.*
Illosporium carneum, *Fr.*
Polyporus undatus, *P.*
Oidium fulvum, *Lk.*
Sphæria xanthostroma, *Mont.*
Clavaria uncialis, *Grev.*
Thelephora corrugata, *Fr.*
Grandinia granulosa, *Fr.*
Sphæria quaternata, *P.*
——— canescens, *P.*
Hydnobolites Tulasnei, *Berk.*
Tuber nitidum, *Vitt.*
Hymenogaster populetorum, *Tul.*
——— lilacinus, *Tul.*
Elaphomyces muricatus, *Fr.*
Cryptosporium Caricis, *Corda.*
Stictis hysterioides, *Desm.*

Sphæria pulicaris, *Fr.*
Mitrula cucullata, *Fr.*
Leotia lubrica, *P.*
Geoglossum difforme, *Fr.*
Mitrula spathulata, *Fr.*
Nidularia campanulata, *Sibth.*
——— striata, *Bull.*
Peziza anomala, *P.*
——— calycina, *Schum.*
Fusarium lateritium, *Nees.*
Dothidea colliculosa, *Berk.* (Æcidii cancellati, stat. imp.)

Uredo Colchici, *Lib.* sub Sporisorio.
Camptoum curvatum, *Lk.*
Arthrinium puccinioides, *Kze.*
Coryneum Kunzei, *Cord.*
Erysiphe communis, *Schlecht.* Potentillarum.
Asteroma Rosæ, *Lib.*
Puccinia Saniculæ, *Grev.*
Depazea Ribicola, *Fr.*
Æcidium Epilobii, *Dec.*
——— Thesii, *Desv.*
Puccinia Circææ, *P.*
Uredo Symphyti, *Dec.*
Fusisporium album, *Desm.*
Æcidium compositarum, *Mart.* Tussilaginis.
Septoria Leguminum, *Desm.* *b.* Pisorum.
Sphæria Rhytismoides, *Bab.*
Melanospora cirrhata, *Berk.*
Excipula graminum, *Corda.*
Bactridium flavum, *Kze.*
Xenodochus paradoxus, *Schlecht.*
Puccinia Umbilici, *Guép.*
Sphæria Ostruthii, *Fr.*
Botrytis parasitica, *P.* Lactucæ.
Asteroma malorum. *Berk.*
Botrytis crustosa, *Fr.*
Septoria Anemones, *Desm.*
Botrytis farinosa, *Fr.*
Uredo Campanulæ, *P.*
——— cylindrica, *Strauss.*
Sphæria maculæformis, *P.*
Uredo Filicum, *Desm.*
Æcidium Behenis, *Dec.*
——— Primulæ, *Dec.*
Uredo Circææ, *A. & S.*
Puccinia Ulmariæ, *Dec.*
Agaricus stipitarius, *Fr.*
Botrytis destructor, *Berk.*
Asteroma labes, *Berk.*
Phacidium Ranunculi, *Lib.*
Puccinia Epilobii, *Dec.*
Uredo Valerianæ, *Duby.*
Puccinia Primulæ, Grev.

publication. I have bestowed upon them my best attention; and yet the list is deficient by a few of the drawings whose counterparts I have not yet met with in nature, and by a very few of the specimens from whose imperfect state no satisfactory conclusions could be drawn. Still I cannot but admire the industry and talents of one who, at least equally successful in all the other departments of zoology and of botany, displayed so intimate a knowledge of plants difficult of investigation, at least before the termination of the last century, when the greater part of his collection was already made.

THOS. TAYLOR.

1. AGARICUS, *Linn.*

vaginatus, *Batsch.*
muscarius, *L.*
clypeolarius, *Bull.*
cristatus, *Bolt.*
eburneus, *Bull.*
rutilans, *Schœff.*
multiformis, *Schœff.*
personatus, *Fr.*
alutaceus, *Pers.*
emeticus, *Schœff.*
cilicioides, *Fr.*
zonarius, *With.*
giganteus, *Sow.*
nebularis, *Batsch.*
pratensis, *Pers.*
puniceus, *Fr.*
coccineus, *Wulf.*
laccatus, *Scop.*
pelianthinus, *Fr.*
butyraceus, *Bull.*
compressus, *Sow.*
confluens, *Pers.*
Clavus, *Bull.*
Rotula, *Scop.*
androsaceus, *L.*
caulicinalis, *Bull.*
galericulatus, *Scop.*
purus, *Pers.*
corticola, *Bull.*
stellatus, *Fr.*
umbelliferus, *L.*
fragrans, *Sow.*
flabelliformis, *Bolt.*
applicatus, *Batsch.*
fertilis, *Pers.*
pascuus, *Pers.*
evernius, *Fr.*
gentilis, *Fr.*
sublanatus, *Sow.*
bulbosus, *Sow.*
scaurus, *Fr.*
aureus, *Bull.*
squarrosus, *Müll.*
mutabilis, *Schœff.*
collinitus, *Sow.*
fastibilis, *Pers.*
flavidus, *Schœff.*
scaber, *Müll.*
geophyllus, *Bull.*
tener, *Schœff.*
involutus, *Batsch.*
variabilis, *Pers.*
Georgii, *With.*
campestris, *L.*
semiglobatus, *Batsch.*
fascicularis, *Huds.*
semiovatus, *Sow.*
Boltoni, *Pers.*
disseminatus, *Pers.*
atramentarius, *Bull.*
micaceus, *Bull.*
cinnamomeus, *L.*
personatus, *Fr.*
fragilis, *Batsch.*
dilutus, *Pers.*
cohærens, *Pers.*
cyathiformis, *Bull.*
chalybeus, *Pers.*
Bulliardii, *Temp.*

2. CANTHARELLUS, *Adans.*

cibarius, *Fr.*
lobatus, *Pers.*
lævis, *Fr.*

3. MERULIUS, *Hal.*

corium, *Grev.*
lachrymans, *Wulf.*

4. POLYPORUS, *Mich.*

lentus, *Berk.*
squamosus, *Huds.*
perennis, *L.*
giganteus, *Pers.*
versicolor, *L.*
pallescens, *Fr.*
radiatus, *Sow.*
medulla panis, *Jacq.*
ferruginosus, *Schrad.*

5. BOLETUS, *Dill.*

luteus, *L.*
bovinus, *L.*
piperatus, *Bull.*
subtomentosus, *L.*
edulis, *Bull.*

6. FISTULINA, *Bull.*

hepatica, *With.*

7. HYDNUM, *Linn.*

repandum, *L.*

8. THELEPHORA, *Ehrh.*

epidermea, *Pers.*
cœrulea, *Schrad.*
aurantiaca, *Sow.*
calcea, *Pers.*
purpurea, *Pers.*
rubiginosa, *Schrad.*
hirsuta, *Willd.*
laciniata, *Pers.*

9. CLAVARIA, *Vaill.*

coralloides, *L.*
rugosa, *Bull.*
pistillaris, *L,*
vermicularis, *Sow.*
tuberosa, *Sow.*
cornea, *Batsch.*
inæqualis, *Müll.*
pratensis, *Pers.*

10. GEOGLOSSUM, *Pers.*

glabrum, *Pers.*

11. MITRULA, *Fr.*

paludosa, *Fr.*

12. TYPHULA, *Fr.*

erythropus, *Fr.*

13. PISTILLARIA, *Fr.*

puberula, *Berk.*

14. Helvella, *Linn.*
lacunosa, *Afz.*

15. Leotia, *Hill.*
lubrica, *Scop.*

16. Peziza, *Dill.*
vesiculosa, *Bull.*
humosa, *Fr.*
coccinea, *Jacq.*
brunnea, *Alb. & Schw.*
scutellata, *L.*
stercorea, *Pers.*
virginea, *Batsch.*
calycina, *Schum.*
inflexa, *Bolt.*
Calyculus, *Sow.*
citrina, *Hedw.*
lenticularis, *Bull.*
cinerea, *Batsch.*
acicularis, *Bull.*
aurantia, *Pers.*
aquatica, *DeCand.*
cochleata, *Bull.*
lycoperdioides, *DeCand.*
nivea, *Hedw. fil.*
villosa, *Pers.*
papillata, *Pers.*

17. Bulgaria, *Fr.*
sarcoides, *Jacq.*

18. Tremella, *Dill.*
mesenterica, *Retz.*
albida, *Smith.*
sarcoides, *With.*
difformis, *With.*

19. Dacrymyces, *Nees.*
stillatus, *Nees.*

20. Sclerotium, *Tode.*
complanatum, *Tode.*
durum, *Pers.*

21. Nidularia, *Bull.*
Crucibulum, *Pers.*

22. Sphærobolus, *Tode.*
stellatus, *Tode.*

23. Pilobolus, *Tode.*
crystallinus, *Tode.*

24. Sphæria, *Hall.*
militaris, *L.*
Hypoxylon, *L.*
carpophila, *Pers.*
fragiformis, *Pers.*
fusca, *Pers.*
stigma, *Hoffm.*
disciformis, *Hoffm.*
flavo-virens, *Hoffm.*
coccinea, *Pers.*
aurantia, *Pers.*
byssiseda, *Tode.*
moriformis, *Tode.*
Pulvis pyrius, *Pers.*
ocellata, *Fr.*
Tiliæ, *Pers.*
Gnomon, *Tode.*
punctiformis, *Pers.*
Ægopodii, *Pers.*
Vaccinii, *Sow.*
Taxi, *Sow.*
rimosa, *Sow.*
Ilicis, *Schleich.*
lanciformis, *Fr.*
spermoides, *Hoffm.*
acuta, *Hoffm.*
serpens, *Pers.*

25. Dothidea, *Fr.*
typhina, *Pers.*
Geranii, *Fr.*

26. Rhytisma, *Fr.*
Acerinum, *Pers.*

27. Phacidium, *Fr.*
coronatum, *Fr.*

28. Hysterium, *Tode.*
pulicare, *Pers.*
Fraxini, *Pers.*
conigenum, *Mong. et N.*
Rubi, *Pers.*
Pinastri, *Schrad.*
Juniperi, *Grev.*

29. Bovista, *Dill.*
nigrescens, *Pers.*

30. Lycoperdon, *Tourn.*
cælatum, *Bull.*

31. Elaphomyces, *Nees.*
granulatus, *Alb. et Schw.*

32. Æthalium, *Link.*
septicum, *L.*

33. Spumaria, *Pers.*
alba, *Bull.*

34. Didymium, *Schrad.*
physaroides, *Pers.*

35. Physarum, *Pers.*
sinuosum, *Bull.*

36 Craterium, *Trentepohl*
minutum, *Leers.*

37. Stemonitis, *Gled.*
fusca, *Roth.*
ovata, *Pers.*
typhina, *Pers.*

38. Dictydium, *Schrad.*
umbilicatum.

39. Arcyria, *Hill.*
incarnata, *Pers.*
nutans, *Bull.*

40. Trichia, *Hall.*
chrysosperma, *DeCand.*
varia, *Pers.*

41. Perichæna, *Fr.*
populina, *Fr.*

42. Licea, *Schrad.*
cylindrica, *Fr.*
fragariformis, *Nees.*

43. Onygena, *Pers.*
equina, *Pers.*

44. Stilbum, *Tode.*
vulgare, *Tode.*
bicolor, *Pers.*

45. Mucor, *Mich.*
caninus, *Pers.*
Mucedo, *L.*

46. Eurotium, *Link.*
Herbariorum, *Lk.*

47. Cladosporium, *Link.*
Herbarum, *Lk.*

48. Dematium, *Pers.*
ciliare, *Pers.*

49. Aspergillus, *Mich.*
glaucus, *Lk.*

50. Stachylidium, *Lk.*
diffusum, *Fr.*

51. Ceratium, *Alb. et S.*
hydnoides, *Alb. et S.*

52. Botrytis, *Mich.*
vera, *Fr.*

53. Monilia, *Hill.*
racemosa, *Pers.*

54. Fusarium, *Lk.*
tremelloides, *Grev.*

55. Aregma, *Fr.*
bulbosum, *Fr.*
mucronatum, *Fr.*

56. Podisoma, *Lk.*
Juniperi Sabinæ, *Fr.*